

# APPENDIX K -- CORRESPONDENCES & LETTERS RECEIVED ON THE MINIMUM FLOWS & LEVELS PLAN

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June 4, 2001

TO: Janet Llewellyn, Deputy Director,  
Division of Water Resource Management

FROM: Dana C. Bryan, Bureau Chief  
Bureau of Natural and Cultural Resources  
Division of Recreation and Parks

SUBJECT: Draft Report for Minimum Flows and Levels for the Loxahatchee River and Estuary

The Florida Department of Environmental Protection's Division of Recreation and Parks has reviewed the *Draft Report for Minimum Flows and Levels for the Loxahatchee River and Estuary* produced by the South Florida Water Management District (SFWMD). The Division is involved because of the effects of the MFLs on Jonathan Dickinson State Park (JDSP) and the Loxahatchee National Wild and Scenic River, both under our management. We offer the following general comments, followed by specific comments.

The Division is charged with providing recreational opportunities on the lands it manages. JDSP attracts 169,768 visitors annually (1999-00), largely because of the Loxahatchee River and recreation that depends on it. According to research conducted by the Division, the total direct economic impact of JDSP on the local community is \$5,101,443 annually. Deterioration of the ecology and aesthetics of the river are serious concerns that might affect tourists and the local community.

The draft report is evidence of the importance placed upon the health of the Loxahatchee watershed by all the parties involved. As stated in the draft plan, Chapter 373 of the Florida Statutes (F.S.) codifies and identifies the statutory charges for various water resource functions. These functions are comprehensive in nature and include flood control, water quality, supply and storage, as well as fish and wildlife protection.

The Florida Environmental Reorganization Act of 1993 requires FDEP to develop and implement measures to "...protect the functions of entire ecological systems through enhanced coordination of public land acquisition, regulatory and planning programs". The Division also is compelled by Florida Statute 258.037 to establish a policy "to promote the state park system for the use, enjoyment, and benefit of the people of Florida and visitors; to acquire typical portions of the original domain of the state which will be accessible to all of the people, and of such character as to emblemize the state's natural values; conserve these natural values for all time; administer the development, use and maintenance of these lands and render such public service

in so doing, in such a manner as to enable the people of Florida and visitors to enjoy these values without depleting them..."

It is important to note that our statutory charge directs us to conserve and maintain lands and resources in their essentially original state. Up to this point, it is fairly evident that the natural landscape of the Loxahatchee watershed has been altered for the convenience and benefit of the human component of this ecosystem, at the expense of the natural components. The Division believes that it is imperative, if we are to adhere to our statutory charge, that the water necessary to sustain the habitat be restored.

The Division feels that the MFLs in state parks should be established under the direction of Section 373.042 (1), F.S., which states that the water management districts "...shall also consider, and at their discretion may provide for, the protection of non-consumptive uses in the establishment of minimum flows and levels..." Those non-consumptive uses are especially important on public lands and most important on Florida State Parks because of their clear public function of recreation, appreciation of the natural environment, and environmental education.

We recommend use of the State Water Resource Implementation Rule, Chapter 62-40.405, F.A.C., for consideration of the fish and wildlife habitat, maintenance of freshwater storage and supply, water quality, estuarine resources and other issues to protect the ecological integrity of the Loxahatchee River in order to ensure the sustainability of the resource itself.

The MFL rule is intended to ensure the sustainability of water resources. At present, there is substantial evidence that significant or serious (but not permanent) harm has already been done to the Loxahatchee River system. We believe that the river headwaters, the estuary and the river itself should not simply be maintained in the current degraded state, but rather restored and protected to the greatest extent possible, similarly to the state's commitment to Everglades recovery. Most authorities agree that the best method of reducing saltwater intrusion to protect the freshwater community within the park is to restore and protect the watershed of both the river and its tributaries. If we are to meet our obligations under numerous statutes and codes, *we have to take restorative actions as significant as those that altered the natural systems and caused the dilemma we now face.*

We are aware that the North Palm Beach Co. CERP Projects (L-8, ASR, the Hungryland Slough Reservoir, and the C-51 and C-17 back-pumping projects to the West Palm Beach Catchment Area) will generate additional water not only for water supply but for restoration of natural systems. Also we are aware that the City of West Palm Beach produces 48 MGD of effluent that is currently going into a deep well that could be re-used. We have been advised that new water is expected from the Water Preserve Area/L-8 CERP project component. The plan to enlarge culverts at the Beeline Expressway to accommodate flow in the 100 cfs range should provide more water through C-18. It is hoped that the water will be directed into C-14 and into the Northwest Fork and not be directed into the Southwest Fork. It is also hoped that additional storage capacity can be found on public lands in the Loxahatchee Sough and the West Palm Beach Water Catchment Area and that this water can be used during drought periods to maintain

the needed flow on the Northwest Fork to meet restoration goals. However, we do not advocate that water be stored at levels that would harm the natural systems.

We request that SFWMD look at all means to provide more water to the Northwest Fork to drive back the salt water wedge. Given that there is water available and that it simply is a matter of how it is allocated, we request that the water needed to provide 200 cfs or an MFL that will move the salt water wedge outside our park boundary be made available from these or other sources as appropriate. Once the restoration MFL is set, we recommend that it be reserved by rule (Sec. 373.223 (4), F.S.

We offer the following specific staff comments on the draft report:

1. When the primary water resources functions were considered for this report, the maintenance of the integrity of JDSP should have been included (P. 60).
2. The Florida Statute pertaining to the Florida Park Service should have been cited (P. 72).
3. This report should have used the JDSP Land Management Plan.
4. The report switches from the importance of bald cypress (Pp. 40, 51 and 72) to floodplain swamp. We feel the focus must be on the whole community. Cypress is an indicator species, but one that reacts slowly to change. A better indicator species of salinity change is needed although one has not been identified (P. 70).
5. The report states that species abundance and diversity are important when proceeding upstream (P. 85). However, one-day surveys were used in the report, which cannot adequately describe the complexity of the community. A more detailed study has found that there are 88 species within the floodplain near the Trapper Nelson Interpretive Site in JDSP!
6. Both the importance and the lack of information about the tributaries of the Northwest Fork of the Loxahatchee River (Kitching Creek, Hobe Grove Ditch, Cypress Creek, etc.) are stressed in this report (Pp. 88 and 97). However, it is also necessary to protect their upstream sources of water. These properties provide a valuable watershed area and would enhance the protection of the park and river. They are all part of proposed CARL/SOR land acquisition projects. If we require more water for the river, these lands have to be more aggressively pursued by both DEP and the SFWMD.
7. To avoid a situation like the current problems with Cypress Creek, water delivery via the tributaries must be made with lower flow with less turbidity and shoaling. This point needs to be included as a hydrological restoration need and possible acquisition need within this report.

8. Although SFWMD participated in the Kitching Creek Study (Earth Tech), the study was overlooked for this report. It has already been completed as a sub-basin study and should be considered as a model for future studies (Pp. 65 and 114).
9. With regard to possible monitoring and research needs for this project, there appears to be little data on agricultural water withdrawals in the basin (P. 36). To better understand how much water originally drove the system, it would be helpful to understand the early historical flows.
10. We recommend linking all models for a total basin approach.
11. We recommend that efforts be made to correct poor water quality from Jupiter Farms.
12. Along with our concern for the river's biological communities within the park, any adverse impacts to the estuary (Pp. 109 and 113) are of great concern to our agency.
13. To point out a misconception (P. 73), since the 1970s there have been many meetings with our agency, SFWMD, conservation groups and the general public that have dealt with saltwater intrusion. Our agency also participated in the Florida Wildlife Federation Lawsuit against the SFWMD (May 1982) to reduce the S-46 discharges (P. 22).
14. With regard to the submerged weir at the eastern edge of JDSP (Pp. 66, 77 and 105), in 1975 meetings were held, comments made, and drawings completed regarding this proposed structure. Except for the final design, this information is available at the Division's District 5 Office at JDSP. Because of predicted sea level rise, this project has always been a consideration.
15. The proposed MFL is 70 cfs. Nevertheless, the Division staff request an MFL of 200 cfs which, based on our review and understanding of your reports, appears to be sufficient to drive the salt water wedge back to the existing edge of the JDSP boundary, which is also the boundary of the LRWSR.
16. Is the proposed 70 cfs MFL the flow that is to be achieved with the proposed MFL Recovery Plan (Pp. 117-119) or is the proposed MFL Recovery Plan going to be based on future projects and engineering and the exact flow is not yet determined? If the 70 cfs is the recovery MFL, taking 20 years to achieve it is not acceptable.

In conclusion, we are deeply concerned that the SFWMD appears to have withdrawn from its previous commitment to go beyond maintenance of the status quo, to restore and protect the Loxahatchee River, its watershed and the surrounding natural communities. SFWMD has the sole authority to allocate water in South Florida. Therefore, given that there is additional water in this system, that this system has been allowed to degrade and suffer major damage as water was allocated and routed away from it, that it is National Wild and Scenic River, a state park and an Outstanding Florida Water, that utilities and other major water users can seek alternative

Janet Llewellyn  
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June 4, 2001

water supplies while natural systems cannot, that the Everglades Restoration funded with federal and state taxpayers money will provide additional water for water supply purposes, and that restoration and protection of the Loxahatchee River can be achieved by simply allocating back the water that historically flowed through it, we therefore request that the South Florida Water Management District fulfill its statutory charge, "to preserve natural resources, fish and wildlife" by restoring the appropriate historical flows to this system. Once the recovery MFL has been established this water should be reserved pursuant to Sec. 373.223 (4), F.S.

Florida State Parks will not continue to survive in this state if we cannot depend on the water management districts to protect and restore our state park water resources. Given that the State of Florida has invested over \$1 billion to acquire these properties, it is in the public interest to protect and restore them.

DCB/mh

cc: Fran Mainella, Director, Division of Recreation and Parks  
Mike Bullock, Assistant Director, Division of Recreation and Parks  
George Jones, District 5 Bureau Chief  
Pete Scalco, OMC Manager, District 5  
Mark Nelson, Manager, Jonathan Dickinson State Park  
Dick Roberts, Biologist II, Loxahatchee Natural Wild and Scenic River

Changes/Corrections to Minimum Flows and Levels for the Loxahatchee River and Estuary, 5/22/01 Draft

Page 109, under "Brine Releases to the Southwest Fork" – (Recommend replacing all references to "brine" throughout the document as "concentrate" or "RO concentrate". The term "brine" should be used for highly salty water. The concentrate salinity is typically about 16 ppt, and is less saline, on average, than the receiving water).

Second sentence of first paragraph should read: "The current plant is permitted to discharge up to 4 MGD of reverse osmosis concentrate from water obtained from the Floridan Aquifer, and currently discharges an average of about 2 MGD."

Third and fourth sentence should read: "This water flows to an area designated as Class II surface waters (shellfish harvesting), although no harvesting is conducted now. Total ammonia concentrations average approximately 2.5 mg/L, and have been as high as 7 mg/L."

First sentence of second paragraph should read, "The current permit is set to expire in June 2001 and allows a mixing zone for combined radium, gross alpha particle and fluoride of 400 meters on each side of the outfall." (eliminate the second sentence as currently given)

Second and third sentence should read: "Nitrogen levels in the discharge are of concern. The Town and the DEP have agreed to work together in assessing any impacts from the RO concentrate during the upcoming TMDL review."

Page 110, under "Water Quality", the last sentence in the third paragraph is misleading and should probably be eliminated. The concentrate is generally less saline than the receiving water, and therefore there should be no reason to dilute the concentrate to make it less saline than the receiving water.

Page 110, under "Water Supply", the last sentence in the first paragraph should be changed to delete the reference to the need for dilution of the concentrate to avoid toxicity problems. There is no evidence that this is the case.

Page 113, the third paragraph is misleading and should probably be deleted. First of all the term "hypersaline" is misleading, as the concentrate is less saline than the receiving water. Secondly, the "ion imbalance" toxicity effect is minimal, and generally occurs only in the immediate vicinity of the outfall. On average "chronic" toxicity occurs within a few meters of the outfall; during worst case conditions within 10 meters. The DEP has granted a variance from the acute toxicity criteria after the town demonstrated ion imbalance toxicity. There is no need to add fresh water to further reduce this minimal area of "toxicity" near the outfall. The only reason to "dilute" the concentrate with additional fresh water is to reduce the potential for exceeding the current mixing zone limitation, and it's questionable whether this is necessary to protect water quality or in the public interest.



**Subject: Re: NPB Reuse Project**

**Date:** Thu, 07 Jun 2001 14:59:35 -0400

**From:** "Rim Bishop" <rbishop@sua.com>

**To:** <mjmorris@sfwmd.gov>

**CC:** <Dan-C@lbfh.com>, <Dave-X@lbfh.com>, <nnason@nasonyeager.com>, <dswift@sfwmd.gov>, <klamart@sfwmd.gov>, <rosorio@sfwmd.gov>, <sburns@sfwmd.gov>, "Bruce Gregg" <bgregg@sua.com>

Given our time constraints, following is an incomplete listing of Seacoast comments relating to the May 22, 2001 draft of SFWMD's Minimum Flows and Levels for the Loxahatchee River and Estuary. Having received the document by courier this morning, we understand that you need these comments by tomorrow. Seacoast reserves the right to comment further and of course, to object to the plan if further review reveals that to be appropriate.

1. Please correct the spelling of "Seacoast" wherever it is used in the document. You may also wish to check the spelling of "Riviera" (page 35, for example).
2. You may wish to review the last sentence of the second paragraph on page 9 to determine that it clearly conveys SFWMD's intent.
3. Table 6 stretches the definition of the "Loxahatchee Basin" substantially. We question the purpose and propriety of listing Palm Beach County, Riviera Beach, Century Utilities, Good Samaritan Hospital, Mangonia Park and any Seacoast wellfield other than Hood Road. To include these implies that there is a far greater public water supply demand on the real Loxahatchee watershed than truly exists. Credibility is an essential element of this report, and this inappropriately implied demand strains it.
4. Page 47 - Wellfield Pumping - As you have done, it is correct to note that SFWMD rules prohibit wellfield overpumping. For context, it is also correct and proper to note that there is no evidence that overpumping has occurred. Would you do that please?
5. Have you properly emphasized Tequesta's use of the Floridan aquifer? If they are to be listed as a watershed demand, that reference should probably be balanced a bit.
6. Page 67 - Water Supply - The section appears incomplete.
7. Page 107 - If you are unalterably (and inappropriately in our view) committed to declaring Seacoast's North Palm Beach, Burma Road, and Palm Beach Gardens wellfields to be part of the Loxahatchee watershed, would you at least acknowledge that a documented hydrological divide exists between them and the "real" Loxahatchee watershed? In other words, would you recognize SFWMD's own files on the subject?

That is all we have time for at the moment. In summary, aside from typos, the foregoing comments are connected by a common thread. As currently drafted, this report implies a public water supply threat to natural systems that does not exist, and greater editorial care is needed to correct that.

Thanks for the opportunity to comment. We will send additional comments later should the need arise.

>>> "Matthew Morrison" <mjmorris@sfwmd.gov> 06/07/01 10:28AM >>>  
thanks rim, again....sorry for the short notice.....mjm

Rim Bishop wrote:

> Got your voice mail, we'll do the best we can to turn any comments around to you in a timely manner.

>

> Thanks for the call and the e-mail.

>

> >>> "Matthew Morrison" <mjmorris@sfwmd.gov> 06/07/01 10:04AM >>>

> sending lox mfl document to you today for meeting tomorrow....call if  
> questions.....mjm

>

> Rim Bishop wrote:  
>  
> > I will participate in the conference call. Thank you for the opportunity.  
> >  
> > >>> "Mark Elsner" <melsner@sfwmd.gov> 06/07/01 08:24AM >>>  
> > We are conducting a teleconference to update you on our progress on the  
> > northern Palm Beach County & southern Martin County Reuse Master Plan  
> > Study on Tuesday, June 12 from 2 pm to 3 pm. We will provide you with a  
> > call in number next Monday. At this teleconference, we will discuss  
> > with you where we are at in our procurement process, participation on  
> > the consultant selection committee (we would like to have 2 of you on  
> > the committee), and partnerships (the District's May letter from Matt  
> > Morrison). Please reply back to me if you are going to participate in  
> > the teleconference or not.  
> >  
> > Your active participation is critical to make this project a success, so  
> > please make room in your busy schedules for this teleconference. If you  
> > have any questions, please email me or call me at (561) 682 -6156.  
> > Thanks.  
> >  
> > Mark

**LOXAHATCHEE RIVER MFLs  
RULE CRITERIA DEVELOPMENT WORKSHOP  
JUNE 8, 2001**

**PUBLIC COMMENTS AND QUESTIONS**

1. What science was used to determine harm, significant harm and serious harm?
2. A gap exists between when the water reservation ends (in Phase I) and when MFLs begin (in Phase III). How is that gap filled regarding assurances for freshwater input to the Loxahatchee River? Is this based on a rainfall-driven determination?
3. The MFL implementation process seems to be reversed in regards to Consumptive Use (CU) permitting – it will take many years to be able to meet the MFLs for the Loxahatchee River but it would only take a few months to reduce consumptive use within the basin. Why is the process like this? For example, Golf Digest – the recent issuance of a CU permit to this development is not helping the situation in the River and is contributing to the significant harm occurring there. CU permitting is adding to the problem of not having enough water for the Loxahatchee River. We need to develop new CU permitting criteria and implement the water reservation.
4. When the District issued a CU permit to Seacoast Utility, it allowed an increase in Seacoast's water supply. Are they allowed to pump out of the Loxahatchee Slough? It will take a surface water elevation of 17.5 feet to restore the Loxahatchee Slough and the District is allowing surface water withdrawals down to 14 feet; therefore, less water will go down to the NW Fork of the River. Seacoast should use a reverse osmosis plant in order to be able to restore the Loxahatchee Slough and to maintain flows to the NW Fork of the River. In addition, surface water will be lost to deep well injection.
5. There are currently two CU permit applications requesting to increase water withdrawals from the surficial aquifer in order to water golf courses. Each golf course would be withdrawing 30" of water. Why would you allow water to be used in this manner, taking it away from the Loxahatchee River?
6. The MFL draft document should outline CU permitting data/statistics from the Loxahatchee basin – i.e. identify how much water is used for what purposes (agriculture, golf courses, municipalities, residential, specific developments (WCI), etc. The document should clarify exactly how much water is used and how it effects/has effected the Loxahatchee River.
7. (In response to Scott Burns statement that there was no verification that CU had any impact(s) on the Loxahatchee River) We do, in fact, have an indication that CU permitting has adversely impacted the Loxahatchee River cypress community. CU permitting is a plausible factor in causing harm, significant harm, and serious harm.

We think CU permitting over the last 20 years is the main factor responsible for adverse impacts to cypress communities on the Loxahatchee River. When conditions from 1940, 1975, 1980 and now, are compared, you can see the adverse effects that increased CU have occurred in the basin. In addition, there has even been an increase in the regression of cypress in the last 20 years; yet no significant hydrologic changes have occurred in the basin during that time. Therefore, CU has a direct link to adverse impacts to the Loxahatchee River over the last 20 years because the last mile of dead cypress that has occurred in the last 20 years isn't a result of activities within the watershed that occurred before 1980. We need a water reservation for the River, today, and no more water allocations should be made until all of these issues are resolved.

8. What about utilizing benthic macro-invertebrates as an indicator of significant harm? Rick Dent pointed out that the macro-invertebrate study that the Loxahatchee River District performed only established station in mostly freshwater and mostly saltwater locations, there were no in-between stations. Therefore, it would be difficult to utilize this information.
9. What about utilizing recreational use (times when the River is not accessible for all of the "normal" recreational uses) as an indicator of significant harm?
10. The MFL draft document does not address any indicator species (flora or fauna) that could be utilized to determine any short-term impacts association with flows and salinity.
11. What about economic impacts associated with establishing an MFL for the Loxahatchee River? The economic impact(s) to Martin County should be addressed.
12. The establishment of the MFLs should take into account the historical and future conversion of land-use/land-use patterns to determine when and how changes to the Loxahatchee River have occurred and will occur. The District needs to make sure that enough water will be there in 20 years to be able to meet the MFLs; to see how much water will be left over for the Loxahatchee River. This would require reviewing all CU permitting data and statistics. The District is currently issuing CU permits without even knowing how much water will be available to meet the MFLs in the future.
13. Are there any state or federal standards for salinity in freshwater systems (i.e. NFDS)?
14. The Loxahatchee River District indicated that they have obtained some additional data from their water quality monitoring station #66, over the last few months, that is available to the District.

15. Clarification was requested for the meaning between the “flows needed at river mile (RM) 8.1 to hold the salinity wedge downstream of Kitching Creek” and “flows at Lainhart Dam”.
16. The flows downstream of RM 8.1 increase significantly as you move downstream. Some people were confused about the difference between the proposed MFLs and flows that equate to restoration. Would the proposed MFLs allow for restoration of the NW Fork of the River?
17. Jonathan Dickinson Park staff indicated that they have flow data for Kitching Creek.
18. The District needs to have a public workshop on the MFL modeling to present the assumptions used in the model.
19. Did the District run models on different salinity factors, such as using anything other than the 2ppt salinity wedge? (i.e. use 0ppt, 1ppt, 2ppt 3ppt etc. instead of 2 ppt)?
20. If the District performed modeling of a salinity barrier in the NW Fork of the River, would it be performed utilizing the existing conditions of the River/watershed? How might the salinity barrier be constructed/engineered? Would different locations for the salinity barrier, be evaluated?
21. The MFL should have a range, not just be a specific number.
22. Regarding a potential future salinity barrier, someone stated that they would hate to see that as the direction taken.
23. There was confusion regarding a 5-6 day duration component to the MFL (this is only the response time that it takes for salinity wedge to go from station 64 to station 65).
24. What flows did the model assume was input from the other tributaries to the NW Fork of the River? Did the model determine what these tributary flows might do for the NW Fork? Could this modeling assess alternative scenarios? The model cannot be based operationally only utilizing the Lainhart Dam; the entire watershed needs to be utilized.
25. How much water is available based on the North Palm Beach County Comprehensive Water Management Plan? Did water outputs indicate that there wasn't enough water in the basin, two years ago? Since then the District issued a CU permit for the Golf Digest development. How does the District anticipate meeting the MFL based on issues like this?
26. A watershed model is needed in order to determine much of the information needed to establish an MFL; we need to know the big picture.

27. Why would the District propose an MFL without having the best science/data?
28. The District should establish the MFL based on a seasonal/wet season component from a biological perspective. Is this on the research needs list in the MFL draft document?
29. Why would the District work with and accommodate the Town of Jupiter to establish an MFL for the South Fork, when the town has been operating under a temporary permit for the discharge of RO concentrate (brine)?
30. The Loxahatchee Wild and Scenic River Management Plan indicates that all permits (not just CU permits) should be reviewed for potential impacts to the NW Fork of the River. Also, that the Wild and Scenic Plan and the 1983 consent decree should be added to the MFL document and bibliography.
31. It was expressed that it shouldn't have to take until the year 2020 to be able to achieve the MFL target.
32. Concern was expressed using the "1995 base case" because 1995 had the highest rainfall for the surrounding period of time.
33. A representative from the Florida Department of Environmental Protection (DEP) indicated that DEP staff had emailed a few general comments to Kathy LaMartina; they would like to see the document address quarterly information regarding CU – how much water goes to each municipality and for what? We need to determine where all of the water in the basin goes, in order to find alternative sources and to see how much we actually have; we need a better picture of the water use in the watershed.
34. Where in the MFL draft Prevention and Recovery Plan is new/future CU permitting in the watershed, addressed? Does the District have the authority to deny new/future permit applications? How could it be proven that future CU would be causing harm to the Loxahatchee River? Would there be a moratorium on CU permits? What is the legal authority that allows the District to say no to CU permitting?
35. Significant harm has already occurred/is currently occurring to the Loxahatchee River and the District continues to issue CU permits to developments such as Golf Digest.
36. Would aquifer storage and recovery help the Loxahatchee River in any way?
37. How will CU permits be evaluated once the MFL is established and put into place? How would CU permit applications be assessed and what would be the availability status of CU permits? Would water re-use be encouraged/be an option?

38. How are the proposed MFLs connected with CERP and to Palm Beach County's sector planning? Since there is a push for changing grove lands to business/residential, how will water issues be dealt with? Currently there is no definitive rule regarding how much water could be allocated. North Palm Beach Comprehensive Water Management Plan (NPBCWMMP) amendments could through a wrench into the whole thing. The District should start the process to get water rules established before these sector plans are initiated.
39. The modeling for the NPBCWMMP is based on watershed/basin conditions now, not in the future, and does not account for population changes, land use changes, etc. It is erroneous that in 2020, when the MFL is proposed to be met, that the conditions would be the same. Therefore, Herb Zebuth was asked to identify incorrect/correct information on a copy of the table "Model Results: MFL Recovery Plan" and submit it to Dave Swift, for Dave to find out additional information regarding the matter.
40. CU permitting does have an impact on minimum flows, specifically in the areas to the north of the NW Fork of the River and flows through Kitching Creek.
41. If Seacoast Utility is permitted to withdraw water from the C-18 canal, down to an elevation of 14-feet, then can no more water be withdrawn for the Loxahatchee River to meet the MFLs or for anyone else?
42. Many questions were brought up about the future Loxahatchee MFL public workshops and how District staff will hear further comments.
43. The State statutes and responsibilities of other agencies (i.e. JD Park) are not necessarily met by the proposed MFL criteria. Therefore, these agencies may not be living up to their statute responsibilities.
44. (question from Scott Burns directed toward JD Park and agencies) Is there a target restoration plan for the NW Fork of the Loxahatchee? What projects are associated with that target restoration? What are the specific numbers for restoration?
45. Attach the Lower East Coast Water Supply Plan (LEC) to the draft MFL document. Also, the District needs to address the bigger watershed issues that include Martin County. Too many boundaries are drawn along the county line. The Loxahatchee watershed should also be addressed in the Upper East Coast Water Supply Plan.
46. In order to obtain an additional 10-20% of water from the basin, for the Loxahatchee River, run models for water conservation (i.e. reducing water withdrawals by half) within the basin.
47. Is the legal definition of harm defined as harm to the watershed or as harm to a specific area or water body?
48. The LEC plan is strictly a report on agriculture; agriculture uses 82% of the water.

49. Since more data/research is needed to refine the currently proposed MFLs, why don't we wait 6 months in order to get this information? We have prolonged the establishment of an MFL since 1997; waiting 6 more months will not make a difference.

50. What is the down-side of having established MFLs?



**Subject: Workshop**

**Date:** Fri, 8 Jun 2001 15:09:00 -0400

**From:** "John Ford" <mjohnf@prodigy.net>

**To:** <klamart@sfwmd.gov>

**CC:** "Pam McVety" <Pam.McVety@dep.state.fl.us>

Kathy, thanks for putting on the MFL Workshop on the Loxahaatchee River and Estuary. There was a good exchange of information and questions/ answers. I would like to receive the publication of the questions and answers from this and future workshops on the Loxahatchee River. You have both my email and home addresses.

I have some questions there was insufficient time to cover in today's meeting in Stuart:

1) Why can the Division not establish and implement interim MFL and continue the do the studies you have planned? It seems to me you are heading toward 70cfm anyhow and this would allow us to get a jump on the process and prevent further damage to the River.

2) Background, first- At a recent meeting of the Environmental Action Committee, Scott Burns commented that when it came to developments and industries water needs versus the environment the environment would always lose. This statement is in the EAC minutes.

My question is- Was this a statement of historic fact or of Division policy? In any case, it is disturbing.

I will not be able to attend the other meetings this month but would appreciate being on the distribution list.

Again, thank you for holding these meetings.

John Ford

From: Joanne Davis  
To: Patricia Weaver  
Cc: Lisa Interlandi ; Charles Pattison ; DEADY, Erin ; Cindy DeFilippo ; Beth Dowdle ; Terrell Arline  
Sent: Friday, June 08, 2001 11:23 PM  
Subject: SFWMD

Dear Karen,

Charles and I attended a workshop SFWMD held regarding the CERP for the L-8 basin Thursday night, and the Minimum Flows and Levels (MFLs) meeting for the Loxahatchee River on Friday.

There is a powerpoint presentation the district has on CERP that would be helpful for the BCC to see, especially with regard to the Sector Plan, north county, water storage, control structures, etc. Erin asked some tough questions in the Thursday meeting. If district staff does not contact the BCC for an agenda item to present what we saw, let us know. There is information available that you haven't seen that will show in general what the CERP proposes.

On Friday, SFWMD presented an update relating to MFLs for the Loxahatchee River. There are important questions that are still not being addressed after 29 years. They (SFWMD) say the river may be safe in 2020 with the work they plan to do. If the SFWMD has not and cannot do the work it takes to restore this unique and wonderful little river, what is the fate of the Everglades, the Lake Worth Lagoon, the Indian River Lagoon, and all the other special watery places in our region? Where are our wetlands and our water supply going in the hands of this agency? What will be left of our lovely river in 20 years?

The relatedness of the L-8 basin and the Loxahatchee River Basin are not being emphasized by the SFWMD. The relatedness of these two basins and the Sector Planning area have not been emphasized by WilsonMiller. The relatedness of Seacoast Utilities' drawdown of critical wetlands to CERP and the Loxahatchee Basin, and consumptive use permits are being downplayed. In the meeting today, I asked how the district was looking at the possibility of increased population and the effect that would have on the basins and the river, only to receive a condescending fifth grade lesson from an engineer about the surficial aquifer. The huge public financial commitment toward land preservation in the north county area did not seem to have an effect in the discussion of protection, preservation, or restoration in terms of timeframe.

North county's water, open land, natural areas, agriculture, lifestyle, and beauty are held in the hands of a state agency that doesn't know where it is going from one administration to the next. That's not good enough, and it does not support us.

In addition, Martin County has not been included in the study for the river's MFLs. Ironical, isn't it, that a Wild and Scenic River's needs and a study have been cut off at a political boundary rather than being viewed as a natural continuum?

We will continue to ask questions.

Page 2 of 2

Yours truly,

Joanne Davis  
Community Planner  
1000 Friends of Florida

**Subject: Re: NPB Reuse Project**

**Date:** Mon, 11 Jun 2001 08:09:58 -0400

**From:** "Rim Bishop" <rbishop@sua.com>

**To:** <dswift@sfwmd.gov>

**CC:** <Dan-C@lbh.com>, <Dave-X@lbh.com>, <nnason@nasonyeager.com>, <klamart@sfwmd.gov>, <mjmorris@sfwmd.gov>, <rosorio@sfwmd.gov>, <sburns@sfwmd.gov>, "Bruce Gregg" <bgregg@sua.com>

The figure comes from a chart on page 7 of a Nature Conservancy document entitled "Water for Our Future, A Guide for Public Discussions." I received my copy attending a public discussion moderated by the Nature Conservancy, hosted by SFWMD, probably a few years ago. I'll be glad to fax you a copy of the page if you like.

It appears to be from data provided by SFWMD, and the footnote at the bottom indicates that of 17.5 million acre-feet per year of water leaving the LEC area: 66% is evapotranspiration, 22.3% through canals and structures, 5.9% through overland flows, 4.1% consumptive use (ALL SOURCES including irrigation, ag, and public water supply, and 1.7% via ground water outflows).

The chart below it indicates that of the permitted consumptive use, 39.2% is public water supply. While I recognize that it oversimplifies a bit, it is therefore correct to say that approximately 1.6% of the water that leaves South Florida annually is for public water supply purposes. Hence my point that public water supply is consistently and inappropriately demonized for depleting natural resources.

Seacoast's Hood Road wellfield is currently permitted to withdraw 10.4 million gallons per day. After SFWMD constructs the C-18 structure for which Mirasol (Golf Digest) paid nearly \$1 million, and after Mirasol completes storage and impoundment facilities that will capture runoff that currently goes to tide, that wellfield's yield will increase to 13.8 MGD. That is the substance of Seacoast's current consumptive use permit. And as far as I know, Mirasol does not have a permit to withdraw ANY water at all from the C-18, though they certainly have made that request of SFWMD.

The other Seacoast wellfields are so far away as to be well outside the Loxahatchee River watershed. You may want to check with Jeff Rosenfeld to confirm this.

As to non-Seacoast consumptive users, those figures are unquestionably available from Scott Burns or Jeff Rosenfeld. In fact, they are part of the LEC Plan (though Seacoast has always held that Northern Palm Beach County should have been included in the Upper East Coast Project - but that's another matter). Here is an interesting observation that you also might want to check out.

Without looking it up, Seacoast (Hood Road), Jupiter, and Tequesta are probably permitted for an aggregate of about 25 MGD from the surficial aquifer. At this time, Seacoast and Lox River District are committed by contract to return about 13 MGD of this to the resource as reclaimed water. This leaves a net impact of about 12.0 MGD to the surficial aquifer in Northern Palm Beach County.

As Jupiter and Tequesta grow, their new demand will be taken from the Floridan, so the reclaimed water that their users generate will be a net positive from here on out, meaning that as long as SFWMD summons the will to require reclaimed water use in our area, the net public water supply impact to the surficial aquifer will actually REDUCE over time. In short, the surficial will, from here on out, be indirectly AUGMENTED by water originating in the Floridan aquifer system.

I am enclosing a summary that I prepared and submitted to Rick Dent some time ago. In my original transmittal, I suggested that the information might be helpful in addressing concerns raised by members of the Loxahatchee River Management Coordinating Council. I also personally addressed the Council, offering backing material supporting my representations. There seemed to be little interest in acceptance of the facts as I presented them, and I therefore have moved on to other

more fruitful pursuits. In the final analysis, all we can do is speak the truth. Having expectations that others driven by opposing "conventional wisdom" will ever embrace our truth simply assures frustrations and animosity, and I will not be part of that.

When the discussion centers on the science of water supply, Seacoast is always eager to participate. We once again offer to do so. But all we have are facts, and when facts are not persuasive, there is little that we can do.

Please let me know how we can assist you further.

>>> "Dave Swift" <dswift@sfwmd.gov> 06/08/01 05:53PM >>>  
Dear Rim:

First, thank you for the quick turn around time and helpful comments. We will make every attempt to include them in the next update of the document. I appreciate your suggestions regarding the public water supply section. We will revise that section accordingly. If your staff has some ideas on how to reorganize the water supply section, we would appreciate your input. I do need some help/or direction however.

At today's MFL presentation in Stuart, Scott Burns was repeatedly asked by numerous members of the public (and FDEP) to explain how much water is used in the basin for consumptive use purposes and how much is available for the river. The issue of how much water is used directly by public utilities and Golf Digest within the Jupiter/Tequesta area was a question asked repeatedly at the meeting.

Can you help or direct me to the data base, information (or person) that I can contact here at the District to obtain information supporting the statement that public water supply consumptive use is less than 5% within the Loxahatchee basin? I too would like to put this issue to rest because it is taking up a lot of time that needs to be focused on other issues. Is this something that Scott's people should be providing me to include in the document, or is this information someone else has? If there is information that supports the statement that consumptive uses utilize less than 5% of the water that is available, for God's sake let's put that information in the document. Who has this information?

Thanks for your patience

Rim Bishop wrote:

> I don't know whether I can make it tomorrow, but I truly would appreciate feedback from District staff either affirming that our comments will be written into the document or explaining why they will not.

>

> As you know, Seacoast has consistently expressed concern that SFWMD documents too frequently overstate the net impact of public water supply consumptive use on regional water resources. This draft document continues that unfortunate tradition.

>

> By SFWMD's own calculations, less than 5% of South Florida's water outflows are attributable to public water supply consumptive use. I suspect that in Northern Palm Beach County, with Jupiter and Tequesta in the Floridan and Seacoast and Lox River District at 100% reuse, the NET effect is even less. Why is it necessary to exaggerate that impact? Except to create an emotional response, there is simply no reason to even mention Riviera Beach, Palm Beach County, Good Sam, Seacoast's other wellfields, etc.

>

> Whoops! I just fell off of my soap box. I guess that means that I'm finished (for now). See you soon Matt.

>

> >>> "Matthew Morris" <mjmorris@sflwmd.gov> 06/07/01 04:23PM >>>

> rim,

**LLOYD BRUMFIELD**  
**11225 SW Meadowlark Circle**  
**Stuart, Florida 34997-2730**

**561-286-3244 Phone/Fax**  
**E Mail: lloyd4@yahoo.com**

**June 11, 2001**

**Peer Review Panel**  
**Minimum Flows and Levels for the**  
**Loxahatchee River & Estuary**  
**C/O Dave Swift, Project Manager**  
**Water Supply and Development Dept.**  
**South Florida Water Management District**  
**PO Box 24680**  
**West Palm Beach, FL 33416-4680**

**SUBJECT: Comments on First Draft, May 22, 2001--Received at Stuart City Hall---**  
**SFWMD Public Hearing June 8, 2001**

**My comments take the form of general observations of the SFWMD's policies, procedures and practices of dealing with water supply and quality in the Upper East Coast--Martin, St. Lucie, and a portion of Okeechobee Counties.**

**I. The SFWMD "Upper East Coast Water Supply Plan--Planning Document-1990-2020--January 1998."**

**Page 1--Chapter 1-Introduction---"Agricultural water demand, which accounts for 84 percent of the overall water demand in the planning area, is expected to increase by approximately 23 percent through the planning horizon."**

**No where can I find that this 84% of the fresh water in the Upper East Coast Area is factored into any planning. It looks to me that all other plans and projects, including the Loxahatchee Minimum Flows and Levels, are dealing with the other 16%.**

**It seems to be an almost fatal flaw in any planning to completely disregard 84% of the users of fresh water.**

38120001444 P. 02

## **II. Quality of Water**

In my dozens, probably hundreds, of meetings, workshops, Governing Board Meetings, etc. have I heard any serious discussion of the quality of the fresh water: at most a glancing remark and get on with it. About all of the water in the Upper East Coast, probably the whole district, is badly polluted mainly by agriculture and development.

The Peer Review Panel needs to give an in-depth review of the quality of water.

## **III. Back-pumping of polluted water into Lake Okeechobee by the SFWMD**

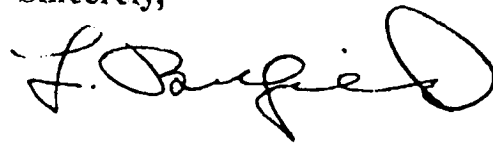
In recent weeks, the SFWMD, twice, has back-pumped water polluted by nutrients and pesticides into Lake Okeechobee. I am aghast. It looks to me that the SFWMD should be setting the example for the rest of us.

## **IV. Wetlands**

I am concerned that wetlands, the funnels of water life, are not getting more than a casual review by all entities in the Upper East Coast and probably the whole of the SFWMD.

I am requesting that the PEER REVIEW PANEL give great consideration to my concerns and any other point of view that has environmental sensitivities.

Sincerely,



Lloyd Brumfield

# Nathaniel Pryor Reed

June 13, 2001

David Swift  
SFWMD  
P.O. Box 24680  
W. Palm Beach, FL 33416

Dear Dave,

I had hoped that our initial meeting concerning the CERP and the establishment of Minimum Flows and Levels for the Loxahatchee River would have guaranteed a viable water supply for the foreseeable future.

You and your staff made a series of commitments at our meeting that I took as a personal guarantee that you were committed to preserving and enhancing the water supply for the river, the only wild and scenic river on the east coast of Florida.

Obviously, I am taken back by Joanne Davis' memorandum on the workshop that discussed the L-8 basin and the MFL's for the Loxahatchee.

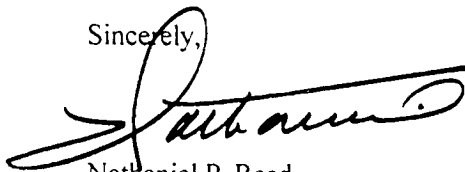
I would like you to take your time and give me your views of Joanne's criticism.

I have great confidence in you and frankly am amazed that Joanne believes that you and your team have failed to really attempt to preserve the Loxahatchee by broadening your approach and taking into consideration the forces of potential adverse impact for the entire basin. I cannot understand why the connection between the L-8 basin and the river is inadequately modeled.

Recognizing that the District is in a time of extreme confusion and also that you and your team has time to make needed corrections, nevertheless I am sufficiently concerned that I urge you to respond to me as soon as possible.

I do think Joanne's suggestion that Martin County be added to the MFL study.

Sincerely,



Nathaniel P. Reed

Enclosure

cc: Joanne Davis  
Herb Zebuth  
Friends of the Loxahatchee  
Charles Pattison  
Lisa Interlandi  
Beth Dowdle  
Mark Nelson

Mailing Address: Post Office Box 1213, Hobe Sound, Florida 33475  
Overnight Delivery: 11844 SE Dixie Highway #C, Hobe Sound, Florida 33455  
Voice (561) 546-2666 ~ Fax (561) 546-5019 ~ E-mail: nat@flinet.com  
K-23

From: Joanne Davis  
To: Patricia Weaver  
Cc: Lisa Interlandi ; Charles Pattison ; DEADY, Erin ; Cindy DeFilippo ; Beth Dowdle ; Terrell Arline  
Sent: Friday, June 08, 2001 11:23 PM  
Subject: SFWMD

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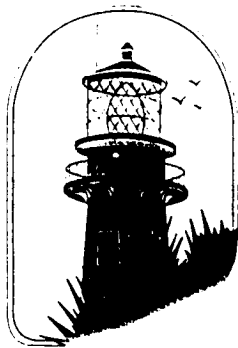
We will continue to ask questions.

Page 2 of 2

Yours truly,

Joanne Davis  
Community Planner  
1000 Friends of Florida





# TOWN OF JUPITER

## UTILITIES

PO BOX 8900  
JUPITER FL 33468-8900  
FAX (561) 747-5634

June 14, 2001

Kathy LaMartina, Program Manager  
District-Wide MFL Program  
South Florida Water Management District  
3301 Gun Club Road  
West Palm Beach, Florida 33406

RECEIVED

JUN 18 2001

WATER USE DIVISION

Re: Draft Document Review/MFLs for Loxahatchee River & Estuary

Dear Ms. LaMartina:

Attached can be found our comments related to the first draft of the MFL document for the Loxahatchee River. We apologize for the delay in our response. We apparently were left off of the distribution list for review. Please see that we receive future revisions for review. Thank you.

Sincerely,

David L. Brown  
Director of Utilities

DLB:pap

cc: Cheryl McKee/FDEP  
Tim Powell/FDEP  
Shannon LaRocque/File  
Ed Weinberg/EW Consultants

K:\Water\Mngmt\DAVID\SFWM\MD\MFLDraft.wpd

1. Executive Summary, page vi, paragraph 3. Add a final sentence which reads:

Due to the lack of water storage in the C-18 basin, the Town of Jupiter has only received flow for aquifer recharge under rare and infrequent circumstances (approximately 60 days over past 10 years).

2. Executive Summary, page vi, paragraph 4, 2<sup>nd</sup> sentence to end of paragraph/Revise to read:

Use of this water from this source enables Jupiter to conservatively limit its reliance on the surficial aquifer without causing impact to the local fresh water systems including the Loxahatchee River. A by-product of this process is commonly known as concentrate and consists of a concentration of the naturally occurring salts and minerals inherent to the Floridan Aquifer. The concentrate salinity is typically about 16 ppt and is less saline, on average, than the receiving water. The concentrate is aerated to remove hydrogen sulfide and add dissolved oxygen before it is discharged into a mixing zone downstream of S-46 per FDEP requirements. The Town of Jupiter has requested the District to consider establishing a minimum flow for the Southwest Fork to provide for greater dilution and mixing of the concentrate and to restore a base line fresh water flow to the tributary similar to that which existed prior to the channelization of Limestone Creek and construction of the S-46 structure.

3. Executive Summary, page vii, paragraph 6 & 7/Revise to read:

**SW Fork of the Loxahatchee Estuary.** The significant harm criteria developed for the SW Fork of the Loxahatchee estuary was based on the need to provide and restore a minimum base flow to the water body while providing for greater mixing and dilution for Jupiter's RO facility concentrate.

Proposed MFL Criteria - A constant minimum flow of 5 cfs through the S-46 structure is recommended to recreate a historical fresh water baseflow through the tributary once known as Limestone Creek while also providing greater dilution and mixing the concentrate from Jupiter's reverse osmosis water treatment facility which is paramount to the region's water supply.

4. Page 62, 4<sup>th</sup> paragraph/Revise to read: Add final two sentences:

Due to the lack of water storage in the C-18 basin, the Town of Jupiter has rarely received water for recharge from the C-18. Flows were diverted from the C-18 Canal approximately only 60 days during the 1990-2000 decade.

5. Page 62, 5<sup>th</sup> paragraph, 7<sup>th</sup> sentence: Revise to read:

A by product of this operation is commonly known as concentrate and consists of a concentration of the naturally occurring salts and minerals inherent to the Floridan Aquifer. The concentrate salinity is typically about 16 ppt and is less saline, on

average, than the receiving water.

6. Page 63, 1<sup>st</sup> paragraph, 2<sup>nd</sup> sentence: Revise to read:

The Town has requested the District to consider establishing a minimum flow for the Southeast Fork of the Loxahatchee estuary to provide for greater dilution and mixing of the concentrate while also restoring a baseline fresh water flow to the tributary to that which existed prior to the channelization of the Limestone Creek and construction of the S-46 structure.

7. Page 65-66, Resource Protection Issues and Concerns.

A paragraph should be added regarding the importance of utilization of alternative water supplies in the Loxahatchee River Basin. Specifically, the role of the use of reclaimed water and brackish water reverse osmosis (BWRO) water treatment should be highlighted. The use of BWRO should be supported through the preservation of the typical fresh water supplies for the environment and the introduction of a "new" source of supply and aquifer recharge when BWRO water is used for irrigation.

8. Page 67, Water Supply -

Refrain from using the word "brine". It is not applicable to BWRO use of the Floridan Aquifer Supply.

9. Page 107, Water Supply Function -

Reference should once again be made to the fact that the lack of water storage within the C-18 basin resulted in the Town of Jupiter rarely receiving water from the system for aquifer and wellfield recharge.

10. Page 109, Brine Release to the Southwest Fork/ Revise to Read: **RO Concentrate Releases to the Southwest Fork**

The Town of Jupiter Water System operates a reverse osmosis (RO) water treatment plant that is paramount to the region's water supply. The facility produces 12 MGD of water from the brackish Floridan Aquifer for use throughout the Loxahatchee River basin for potable and irrigation use. A by product of the RO process is commonly known as concentrate and consists of a concentration of the naturally occurring salts and minerals inherent to the Floridan Aquifer. The salinity of the RO concentrate is approximately 16 ppt which is less than that of the receiving water. The facility is permitted by FDEP to discharge up to 4 MGD of reverse osmosis concentrate. The concentrate is discharged through an underwater diffuser downstream of S-46 to an area of Class II surface waters. The FDEP permit allows for a mixing zone for combined radium, gross alpha particle and fluoride. The Town is currently working cooperating with the FDEP to also monitor long term nutrient

loadings in the SW Fork. Ammonia levels in the RO concentrate average 2.5 mg/l, with one reading was as high as 7 mg/l. Overall, nutrient loadings attributable to the concentrate do not appear to be increasing; however, the matter will be addressed further through the upcoming TMDL review process. Introduction of a 5 cfs base flow to the SW Fork will provide further mixing of the RO concentrate significantly adding to the long-term viability of Jupiter RO process in achieving fresh water preservation for the local fresh water and Loxahatchee River systems.

11. Page 113, Paragraph 4 - delete in its entirety.

“Hypersaline Conditions” or Toxicity due to ion imbalance” issues are erroneous and are not an issue.

12. Page 113. In lieu of paragraph 4 recommended for deletion, add:

The introduction of a 5 cfs base flow to the SW Fork of the Loxahatchee River will provide further mixing of Jupiter’s RO Concentrate significantly adding to the long-term viability of use of brackish waters as alternative supplies in the region and furthering the preservation of local fresh water environments.

THOMAS L. HOWARD –Chairman

GEORGE G. GENTILE – Vice Chairman

MICHAEL A. MARTINEZ – Secretary/Treasurer

MICHAEL J. GRELLA  
Executive Director

KENNETH W. HOLLEY

PATRICIA MAGROGAN

JACQUELINE A. WEBB  
Administrative Assistant

June 14, 2001

Dave Swift, Project Manager  
Water Supply Planning and Development Dept.  
South Florida Water Management District  
P.O. Box 24680  
West Palm Beach, FL 33416-4680

RE: Minimum Flows and Levels for the Loxahatchee River/  
Jupiter Inlet District Gap Closures of N.W. Fork: Statistical Analysis

Dear Mr. Swift:

Enclosed you will find a disk entitled Restoration of Oxbows in the Northwest Fork of the Loxahatchee River. My apologies for not having provided you with this data sooner. I can only say we did not anticipate the extent to which the District has reviewed the available literature in developing MFL criteria. Additionally, this analysis was not conducted until the latter part of 2000 for presentation at the Loxahatchee River Watershed Symposium. The symposium was held in the Jupiter High School Auditorium on February 21, 2001.

In your Draft Report, Minimum Flows and Levels for the Loxahatchee River and Estuary, you cite statistical analysis of flow versus salinity data collected from the N.W. Fork of the river from 1994-2000 as one of the sources of information the District relied on in establishing MFL criteria (p. 50). The analysis was conducted by the Loxahatchee Environmental Control District (LRD) in 1997 and showed our gap closures to have resulted in lower salinity levels upstream of the closures (p. 56).

The disk contains a statistical analysis of sampling stations #63 and #64, before and after the gap closures. Station #65 was not operative prior to Phase I of our project. To summarize, our analysis of the data shows insufficient evidence the gap closures have resulted in a decrease in salinity at the sampling stations (at a 10% level of significance). Whether this is attributable to a somewhat different approach to analyzing the data (the LRD compared maximum daily salinities and response time between stations, while JID compared average monthly salinity data), I cannot say. However, it is interesting to note that your regression analysis comparing your total data set with data collected after closure of the gaps is more in line with our findings (p. 87, Table 15).

400 N. Delaware Blvd., Jupiter, FL 33458 • (561) 746-2223 • (561) 744-2440 (FAX) • Email – JupiterInl@aol.com

Dave Swift, Project Manager  
June 14, 2001

Intuitively, one would expect the added distance required for saline waters to travel (with closure of the gaps) to result in lower salinities at upstream stations. It may be we simply need more time to assess the results. Dr. Ashish Mehta of the University of Florida Civil and Coastal Engineering Department, who provided a peer review of my report, has suggested the relatively little change observed may result from the effects of stratification and the need for at least four measurements at each station. Additional spacing may also prove beneficial in better capturing the salinity gradient between the measurement stations.

We also note in the Draft Report the District's interest in researching the feasibility of installing one or more salinity barriers for the N.W. Fork. The Jupiter Inlet District considered this approach in the mid-1970's and, again, in 1991 (Law Environmental, Inc., 1991). In the first instance, conceptual plans were apparently drawn up but never submitted for agency approval. In 1991, the JID Board of Commissioners again elected not to pursue this management option.

I hope this is of some use to you. Should you have any questions or require additional information, please do not hesitate to contact me at (561) 746-2223.

Sincerely,

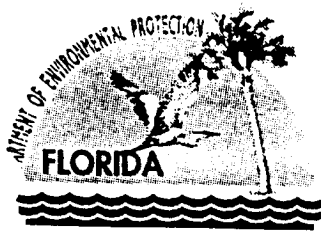


Michael J. Grella, AICP  
Executive Director

MG:jw

C: Kathy LaMartina, SFWMD (without attachments)  
Matt Morrison, SFWMD (without attachments)  
Richard Dent, Loxahatchee River District (without attachments)

attachments



Jeb Bush  
Governor

# Department of Environmental Protection

Southeast District  
P.O. Box 15425  
West Palm Beach, Florida 33416

David B. Struhs  
Secretary

June 15, 2001

Mr. David Swift  
South Florida Water Management District  
P.O. Box 24680  
West Palm Beach, FL 33416

Dear Mr. Swift:

Thank you very much for presenting your Establishing Minimum Water Flows and Levels for the Loxahatchee River paper at the Loxahatchee River Watershed Science Symposium last February. Eighty-five scientists, environmental professionals and local citizens attended the Science Symposium as well as 202 JERFSA students. The Science Symposium provided an opportunity for scientific researchers to gather together and share their work in and around the Loxahatchee River.

Enclosed for your information is a list of ideas and potential funding sources for future research within the Loxahatchee River watershed. These ideas were compiled during the final session of the Science Symposium. There were other ideas submitted on the evaluation sheets and I plan to add those to this list and then provide it to universities and research institutions that are looking for research projects.

Thank you very much for coming to some of our Loxahatchee River Watershed Planning Committee meetings to keep us informed of your progress establishing the MFL for the river. It has been great getting to know you over the past year. Please call me at 681-6708 if I can be of any assistance to you or if you have any questions regarding the outcome of the Science Symposium.

Sincerely,

Cheryl McKee  
Loxahatchee River Watershed Coordinator  
FDEP Southeast District

Enclosure

## LOXAHATCHEE RIVER WATERSHED SCIENCE SYMPOSIUM

### **Ideas for Future Research**

1. Hydrology, groundwater Study for the entire watershed, similar to the Kitching Creek study, including quality and quantity of flow, and historical groundwater data. What is the contribution of groundwater from the basins to the main river channel?
2. Hydrology, study the relationship between the Loxahatchee Slough and the aquifer.
3. Hydrology, study the hydrology of basins to identify which basins can best supply a minimum flow to the NW Fork.
4. Hydrology, measure the flows from major tributaries.
5. Hydrology, develop a sub-regional model that addresses existing water use permits and their effects on the river.
6. Salinity, test salinity in soils along the NW Fork.
7. Salinity, monitor salinity changes in vegetation.
8. Salinity, re-examine putting a saltwater barrier on the NW Fork in Jonathan Dickinson State Park.
9. Salinity, ask Army Corps of Engineers to build a model of Jupiter Inlet.
10. Salinity, develop a 3-D hydrodynamic salinity model of the river.
11. Water Quality, identify best management practices for Jupiter Farms with regard to nutrients.
12. Water Quality, study D.O. problem in Jupiter Farms.
13. Water Quality, identify pollutants may be coming from septic tanks, agriculture and stormwater from Jupiter Farms.
14. Water Quality, expand network of sampling stations to include G-92, drainage canals in Jupiter Farms.
15. Water Quality, sample after rain events.
16. Aquatic Biology, develop a biological index to evaluate success of projects.
17. Aquatic Biology, study methods to control aquatic exotic plants.
18. Restoration, identify Restoration Goals for NW Fork.
19. Study how well rules and regulations are being enforced by various agencies to protect the river



## **Funding Sources for Research Projects**

1. NEP if the Loxahatchee River can be included in the IRL NEP
2. NPDES Program
3. Coastal Zone Management Grants
4. Everglades type program
5. SFWMD Expert Assistance Grants for a modeling scientist
6. National Wetland Restoration Grants
7. Ad Valorem Taxes
8. Coastal Ecosystem Funds
9. IRL License Plate Money
10. Private Donations
11. Create a Loxahatchee River License Plate
12. Public/Private partnership for a Mitigation Bank
13. Utility Surcharge
14. Get other agencies and organizations to participate
15. Cooperation with universities and students to do research
16. Design watercolor or other artwork into prints that depict river scenes and these could be sold

# Nathaniel Pryor Reed

Date: Monday, June 18, 2001  
 To: Joseph Schweigart  
 From: Nathaniel Reed  
 Subject: Loxahatchee River Water Supply

Joe, recognizing that you are really overtaxed with responsibilities, nevertheless I need to bring the potential problems of the Loxahatchee watershed to your attention.

At my urging, Frank Finch organized a meeting January at the District to satisfy the real concerns expressed by the State Park's management team, the DEP and the Friends of the Loxahatchee River.

Dave Swift had been appointed project director. His mission was to identify the amount of water needed to restore the Loxahatchee River and set up a system to control growth within the river's watershed.

The overwhelming sense of the non-District members at the meeting was that the District's water supply staff was intentionally or unintentionally permitting away water desperately needed to serve the river's needs.

Dave Swift gave a really superb briefing that satisfied the various staffs and NGO's that a serious effort was being made to examine the various forces within the watershed that demand water and to preserve sufficient water for the river to guarantee restoration aims.

We left the meeting feeling "comfortable" that the District would unite behind Dave's efforts. I enclose a memorandum from Joanne Davis giving her views as to the substance of the "preliminary briefing—or—an updating on the project's progress".

Since the briefing, my telephone has been ringing with "voices of despair".

Some NGO's are prepared to engage the services of attorneys to press their claims that the water supply chieftains, in particular Scott Burns, have sabotaged Swift's efforts and are permitting vital river water supplies to new developments.

All my efforts to insure that sufficient water for the river is "reserved" and for the District to gain the confidence of the State Parks, Jonathon Dickinson State Park, DEP and the concerned NGO's seems to have failed.

I don't want to bring another problem to Henry Dean's attention when the District has so many problems to solve.

Joe, I trust you to call in the Loxahatchee team and make a firm decision on whether Swift's efforts are being blocked by the supporters of utility water supplies.

|  |              |              |
|--|--------------|--------------|
| Post-It™ brand fax transmittal memo 7671 |              | # of pages > |
| To                                       | Dave Swift   |              |
| From                                     | JOANNE DAVIS |              |
| Co.                                      |              |              |
| Dept                                     |              |              |
| Phone #                                  | 820-9385     |              |
| Fax #                                    | 832-8102     |              |
|  | 681-6264     |              |

Ove

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 ida 33455  
 t.com

Joseph Schweigart

Page Two

June 18, 2001

I don't think it will take you long to figure out if the river and the park's water supply is being given precedence or whether the water supply troops are winning the contest.

I want to restore cooperation between the District the other important governmental agencies and the NGO's as rapidly as possible.

Special best wishes,



Nathaniel P. Reed

Enclosure

cc: Mark Nelson  
Herb Zebuth  
Joanne Davis  
Lisa Interlandi  
Friends of the Loxahatchee  
Maggy Hurchalla  
Beth Dowdle  
Rosa Durando  
Charles Pattison  
Manley Fuller  
Terrell Arline  
Stuart Strahl  
Sally Swartz



Jeb Bush  
Governor

# Department of Environmental Protection

Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, Florida 32399-2400

David B. Struhs  
Secretary

June 18, 2001

Ms. Kathy LaMartina  
South Florida Water Management District  
P. O. Box 24680  
West Palm Beach, Florida 33416-4680

Re: Loxahatchee River and Estuary Minimum Flow

Dear Ms. LaMartina:

The Department appreciates the opportunity to comment on the District's technical document describing the methodology used to develop a minimum flow and level (MFL) for the Loxahatchee River and Estuary. The document lays the foundation for establishing a flow which is needed to reduce the significant harm that the river has experienced for several decades.

The District proposes a MFL for the river which, if adopted, will be a greater minimum flow into the Northwest Fork of the Loxahatchee River than has occurred in the recent past. Additionally, the District recognizes the significance of the river which is Florida's first federally-designated Wild and Scenic River, a part of Jonathon Dickinson State Park, an Outstanding Florida Water, and a state Aquatic Preserve. As your report notes, the river warrants these designations due to the unique resources found there and to the fact that it represents "one of the last vestiges of native cypress river-swamp left in Southeast Florida." For all of these reasons, it is critical that an appropriate MFL be established for the river. While we commend the District on this effort, we would like to note some major concerns with the proposed flow.

From the information presented in the document and discussions with Department's District Office staff and the Division of Recreation and Parks (DRP) staff, it is evident that the Northwest Fork of the Loxahatchee has been experiencing serious harm for many years. The many acres of cypress-dominated communities that have been lost due to saltwater intrusion would take many decades to recover to their historical state. Since the 1970s, the DRP has expressed (to the District and other entities) their concerns about the damage occurring along the river. While the flow proposed by the District will offer some relief to the remnant cypress communities found upstream of Kitching Creek, it will still allow the serious harm to continue downstream of river mile 8.1.

Additionally, the proposed MFL will allow significant harm to continue within portions of Jonathon Dickinson State Park, the boundaries of which continue downstream to

approximately river mile 6.5. The DRP manages the land owned by the state along the Loxahatchee River. As managers of the land, the DRP is directed "to promote the state park system for the use, enjoyment, and benefit of the people ...; to acquire typical portions of the original domain of the state ....of such character as to emblemize the state's natural values; conserve these natural values for all time; .... to enable the people ...to enjoy these values without depleting them...(s. 258.037, F.S.)." It is important to note that DRP's statutory charge directs them to conserve and maintain lands and resources in their essentially original state.

We note that the proposed MFL would prevent significant harm only within a portion of the Park's boundaries and would allow significant harm to continue to the eastern boundary of the Park. The minimum flows and levels statute is intended to prevent "significant harm to water resources or ecology of the area (s. 373.042(1)(a), F.S.)." It is clear that significant harm is occurring along the river and will continue to occur along portions of the river with the proposed MFL. Additionally, we note that minimum flows and levels may provide for the protection of non-consumptive uses (s. 373.042(1), F.S.). Those non-consumptive uses are especially important on public lands and most important on Florida State Parks because of their clear public functions of recreation, preservation of natural values, appreciation of the natural environment, and environmental education. The District needs to include the maintenance of the integrity of the Park as one of the primary water resource functions (p. 60) that should be considered when establishing a MFL.

We recommend that the MFL be established at a flow that would move the saltwater wedge downstream of Jonathon Dickinson Park's eastern boundary.

### **Recovery and Prevention Strategy**

The recovery and prevention strategy provided as part of the technical document, appears to propose projects that will immediately increase flows to the river, at least to some extent, within one year. However, it is not clear how much improvement to flow will occur in this and the subsequent phases that will be implemented in later years. To adequately evaluate the effectiveness of the strategy, the District should provide an estimate of the flow that each project will provide to meet the MFL and an estimate of the total MFL flow that will be delivered over Lainhart dam as each phase is completed. The Department would be greatly concerned if the recovery strategy proposes to take 20 years to restore a substantial amount of the flow needed to prevent significant harm. By that time any of the "healthy" cypress communities identified in the current report would be significantly harmed.

The recovery strategy does not identify any projects within the tributaries that might contribute to increasing flows to the river. While the District has indicated that more information is needed to determine the water budgets for these tributaries, the District should also conduct an analysis of the potential for increasing flows, especially during dry periods, from these tributaries by increasing storage or restoring ecosystems within the watershed. For example, there may be an opportunity to correct over drainage problems in Cypress Creek Basin and the South Indian River Water Control District. Lands along these tributaries are

proposed for acquisition by the state and could provide a valuable opportunity to protect and enhance flows to the river.

Since this MFL will become incorporated into Chapter 40E-8, we are assuming that any new allocations requested that would affect the Loxahatchee River will be subject to the provisions described for evaluating such applications in B.O.R. 3.9.1. Specifically, we are assuming that no new permits will be issued for withdrawals which will directly affect an MFL water body, until "...sufficient additional water has been made available for the new or increased portion of the requested allocation via certification of a project or project phase of the recovery strategies, as certified by the District, pursuant to Rule 40E-8.421(1)(e), F.A.C." ( per the proposed B.O.R.3.9.1(2)(a), F.A.W. Vol. 27, No. 13, 3/30/01).

Additionally, we would like to request that the District add a strategy that will encourage and promote existing permitted users within the basin to use more reclaimed water, new users to meet demands with reverse osmosis treatment of water from the Floridan Aquifer, and to reduce consumption through conservation. While we know that the District's CUP program encourages this to some extent, the recovery strategy should include additional measures.

#### **Consumptive Uses within the Basin**

This document should provide more information regarding water use in the area. A more detailed analysis of the consumptive water use within the basin and alternative sources should be included in this study. While the drainage projects and inlet opening are serious contributions to the problems experienced within the river, the document minimizes the impacts of consumptive uses to the system, especially during dry periods.

There is no mention of water users located outside of the watershed that have diverted water for consumptive use from the river, its headwaters, and watershed. For example, the volume of water in the consumptive use permit for Seacoast Utilities was increased from 10.4 MGD to 13.8 MGD for an average withdrawal and from 13.6 MGD to 19.2 MGD for a maximum withdrawal. There is no analysis of the impacts associated with the specific diversion of water to utilities in West Palm Beach and Palm Beach Gardens. While the Town of Jupiter and Village of Tequesta have made the investment to construct reverse osmosis plants and get 50% of their water from the Floridan Aquifer, other water utilities that divert water from the Loxahatchee Slough and Watershed have not. Residents and developers outside the watershed with little knowledge of the plight of the Loxahatchee River, continue to extract water from the Loxahatchee Watershed, which could be used to prevent the significant harm currently experienced by the river.

Furthermore, there should be some discussion of the amount of water consumed by agriculture, how much of that water comes from within the watershed, and how much comes from reclaimed water. According to a Department survey three years ago, not all of the golf courses in northern Palm Beach County used reclaimed water to irrigate. The two major orange groves receive part of their irrigation water from outside the watershed via a canal that is fed from the St. Lucie Canal. In contrast, the newest golf course in the watershed, Golf

Digest, siphons off up to 20 cfs directly from the C-18 Canal to maintain the water level of their lakes. Those users not already receiving reclaimed water should make every effort to do so, rather than lowering the water table and diverting fresh water away from the river. By not outlining the volumes of water consumed by permitted users, especially during droughts, this study cannot adequately consider all of the recovery options.

### **Linkage with Northern Palm Beach County Comprehensive Water Management Plan**

The report does not clearly describe the relationship between activities identified within the Northern Palm Beach County Comprehensive Water Management Plan and the activities needed to restore flows to the river. There are concerns that projects identified in the water management plan and the modeling analysis conducted as part of the development of that plan might be inconsistent with the MFL recovery and prevention strategy identified in the technical report. The District should clearly describe how projects identified in the water management plan will influence the ability to provide water to meet the Loxahatchee MFL.

### **Research Needs**

Commendably, the District has identified a set of research projects to more adequately determine the technical relationships between flow, salinity, and observed impacts to vegetation. The District should provide estimates of the dates each project will start and be completed.

### **Water Quality**

The document includes a discussion of water quality in several places (including pp. 68 and 111). On both of these pages it is stated that "water quality in this system is generally adequate to meet the designated uses." For your information, five waterbodies within the Loxahatchee River watershed are 303(d) listed for failure to meet their designated use, as follows:

| <b>WATER BODY</b>           | <b>WATER QUALITY PARAMETERS FOR 303(d) LISTING</b>          |
|-----------------------------|---|
| Northwest Fork              | DO, Nutrients   |
| Southwest Fork              | DO, Coliforms, Nutrients                                    |
| Kitching Creek              | DO, BOD, Coliforms, Nutrients                               |
| Loxahatchee River (estuary) | (listed based on an NPS survey)                             |
| C-18                        | DO, Coliforms, Mercury (based on fish consumption advisory) |

### **Criterion for the Southwest Fork**

The proposed flow criterion for the Southwest Fork does not appear to have a firm scientific foundation. The purpose of establishing an MFL is not to provide dilution of a "brine

discharge." Flows should not be diverted away from those critically needed at the Northwest Fork for dilution of brine elsewhere.

### Summary

In our view, the starting point for establishment of a minimum flow for the Loxahatchee River should be restoration of natural flows. The technical documents should clearly state what is the best estimate of those unimpaired, natural flows, based on available information. After identifying these target conditions, the document should clearly identify the flows that are needed to prevent significant harm and the flows necessary for restoration. The MFL ultimately established should come as close to full restoration as is reasonably possible. The associated recovery strategy should lay out systematically what measures would be necessary to achieve the MFL. If it is determined to be impossible to fully restore natural flows, the recovery strategy should nonetheless state quantitatively exactly how much flow restoration is recommended to be achieved by each restoration measure, how much of the water provided by that measure will be allocated to other users, and what is the anticipated lowest flow of the Loxahatchee after each measure is operational.

We appreciate the opportunity to work with the South Florida Water Management District on these important efforts. Additional specific comments are attached, as well as a detailed memorandum from the Department's Division of Recreation and Parks. As you mentioned in the report cover memo, there is an opportunity for interested parties to provide comments to the Peer Review Panel. The Department requests an opportunity to make a presentation to the Panel.

Sincerely,

Tom Swihart  
Environmental Administrator  
Office of Water Policy

TS/kpg

Attachments

cc: Janet Llewellyn, DEP  
Melissa Meeker, DEP  
Pam McVety, DEP  
Dana Bryan, DEP  
Herb Zebuth, DEP  
Cheryl McKee, DEP  
John Outland, DEP  
Danny Riley, DEP



## MEMORANDUM

TO: South Florida Water Management District Staff  
FROM: Richard C. Dent  
DATE: June 25, 2001  
SUBJECT: Draft Minimum Flows and Levels for the Loxahatchee River and Estuary

Sorry I took so long to type up these notes. Tried to keep the comments directed at enhancing the technical accuracy of the draft.

1. pg. 1: still confusion as to the role stormwater management and permitting plays – it should be included as a resource protection tool.
2. pg. 10: the Loxahatchee River and Estuary and the watershed were actually split and included in parts of the LEC and UEC plans.
3. pg. 10: 200 square miles is incorrect and should be replaced by 280 square miles throughout the report.
4. pg. 11: the river and estuary makes up parts of two aquatic preserves.
5. pg. 11: vision for protecting river should include '5) protect corridor from future hydrologic and water quality problems.
6. pg. 12: A more recent report (Dent, R.C., 1997. Rainfall Observations in the Loxahatchee River Watershed. Loxahatchee River District) updates data and offers observations such as spatial, east-west differentials, etc.
7. pg. 12: the period of record on the table and in the narrative is not correct.
8. pg. 12: the dates of drought conditions should include 1970-71 to be consistent with Table #1.
9. pg. 13: 250 square mile historic watershed is not accurate, was likely over 400.
10. pg. 15: Cypress creek drains only a limited portion of Jupiter Farms.
11. pg. 17: the first paragraph should mention Jupiter Farms and water quality observations.
12. pg. 17: the paragraph on the north fork could include observations of muck and documented macroinvertebrate changes.
13. pg. 18: the sandbar in the central embayment is exposed daily at low tide, not occasionally.
14. pg. 18: the comments on seagrass are limited. More recent seagrass data available from Jupiter Inlet District and Loxahatchee River District (Ridler, Mary S., R.C. Dent and L. R. Bachman, 1999. Distribution, Density and Composition of Seagrasses in the Southernmost Reach of the Indian River Lagoon. Loxahatchee River District)
15. pg. 18: comments on macroinverts are limited. Published reports by Harvey Rudolf and the Loxahatchee River District are available.

16. pg 19: the discussion of the coastal subbasin could be expanded to incorporate national significance of the Indian River Lagoon, the two aquatic preserves and reference to general environmental health as documented by seagrasses, mangrove and macroinvertebrate work.
17. pg.21: C-18 basin accounts for something less than 40 percent of the full watershed
18. pg. 21: major changes paragraph needs to include Jupiter Farms.
19. pg. 22: G-92 was originally constructed with the 50-100 cfs capacity. The ability to move 50 cfs has existed for over 25 years. Structure size was not limiting, water supply was.
20. pg. 22: millions of gallons per hour (mgh) should be millions of gallons per day (mgd)
21. pg 22: the c-14 canal was constructed to drain Jupiter Farms well before the G-92 was constructed.
22. pg. 26: the term 'local drainage works' in the first paragraph should be replaced with 'the C-18 canal'.
23. pg. 26: I do not recall a small culvert existing before 1975.
24. pg. 26: the minimum flow discharges to the river thru G-92 have not increased significantly in dry periods.
25. pg 26: supplemental discharges 'frequently' are terminated. This whole section greatly overstates the success of past efforts.
26. pg 27: water quality section. A mention of the LRD as the data provider would be appreciated.
27. pg 30: Subbasin #5 – recent and limited data may indicate some nutrient problems.
28. pg 31: Let's tell it like it is. Water quality data from the ag community hasn't been available for 20 years.
29. pg 31: ongoing work by the LRD and the DEP is providing pesticide and metals data.
30. pg 31: need to mention the observed shoaling
31. pg 32: the references to LRD in the last paragraph should be changed to SIRWCD.
32. pg 35: the second paragraph seems to indicate that the agric. Lands are separated from the river. This is not true as they were connected via ditches.
33. pg 35: in the water supply section, the comment that there are 'some' agricultural uses is misleading. Several of the public utilities listed don't relate to the watershed.
34. pg 36: 1995 was a very wet year and the agric demands shown in the table probably are low if compared to a normal year. redo the table on urban supply and the table on agric uses, then recalculate the agric/urban relationship.
35. pg 36: WQ section. Why are there two water quality sections (see page 27). Can they be combined.
36. pg 38: the water quality values may have been 'documented in' the Watershed Plan headed by DEP, but the data were provided by and 'documented by' the LRD.
37. pg 44: a commented on high quality macroinvertebrate communities could be included.
38. pg 62: water supply section should show projected needs for each utility.
39. pg 63: 'implementation' not 'establishment' of MFL will help the river.
40. pg 64: the table again raises the question about the extent of Class II waters designation upstream in the northwest fork.

41. pg 65: the last paragraph speaking to observed degradation in river over 30 years seems inconsistent with the first sentence. Also inconsistent with comments on page 67.
42. pg 66: several local options were identified in a report submitted to the Loxahatchee River Management Coordinating Council (Hazen and Sawyer, 1999. Stormwater Management Plan for the Wild and Scenic Northwest Fork of the Loxahatchee River. Loxahatchee River District)
43. pg 68: water quality. Again would appreciate some mention that well over 90 percent of the water quality monitoring, analysis and compilation is done by LRD.
44. pg 68: the water quality is not adequate to support shellfish harvesting in the estuary and hasn't been for a long time.
45. pg 68: the fecal and total coliform concentrations 'periodically' exceed the standards.
46. pg 80: the c-14 canal was constructed much earlier then the G-92 and the canal replaced a reach of the historic river channel.
47. pg 82: An update on droughts should include the 200-01 period.
48. pg 87: WQ station #63. Station #62, located at the Island Way Rd. bridge is closer to the embayment.
49. pg 97: the math in the third bullet varies from McPhearson – same observation on page 100, section #4. I believe the inclusion of groundwater is the difference.
50. pg 109: volumes at the Jupiter water plant should be 12 MGD and 24 MGD
51. pg 111: the shellfish harvesting criteria is not met.
52. pg 111: total and fecal coliform have been sampled. Fecal coliform more prominent in recent years.
53. pg 113: large discharges from the C-18 canal have been documented to result in zero salinity in the estuary for several days.
54. pg 114: the second paragraph is inconsistent in the MFL volume on page 104.
55. pg 115: research materials. The Loxahatchee River District has more recent benthic invertebrate, fish and seagrass data.



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# TOWN OF JUPITER

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UTILITIES  
PO BOX 8900  
JUPITER FL 33468-8900  
FAX (561) 747-5634

June 28, 2001

Kathy LaMartina, Program Manager  
District-Wide MFL Program  
South Florida Water Management District  
3301 Gun Club Road  
West Palm Beach, Florida 33406

Re: Proposed Loxahatchee River MFLs

Dear Ms. LaMartina:

This letter is written to provide further thoughts that may further aid the District in finalizing MFLs for the Loxahatchee River.

Jupiter Utilities serves as the primary water purveyor for region spanning from Juno Beach to and including southern Martin County. Being an extremely environmentally conscience community, Jupiter opted in 1988 to obtain its future water supply from alternative sources leaving and preserving local fresh waters for the environment. This has been successfully accomplished over the past decade through reverse osmosis treatment of the brackish Floridan aquifer supply. The Town's water treatment facility is now capable of producing 12 MGD through brackish water reverse osmosis (RO). More RO production is anticipated in the future.

The utility has a permitted SFWMD max daily withdrawal allocation from the surficial aquifer of 18.5 MGD. Of this, only 10 MGD is now used on an average basis which is no more than was used over 10 years ago even though the area has experienced tremendous growth.

During this year's drought, Jupiter was capable of addressing its average daily demand completely through desalination, and no impact was caused to local fresh water resources as a result of the urban consumptive use.

We are thankful of SFWMD staff for recommending an MFL for the Southwest Fork. The minimal flow of 5 cfs will provide an insurance policy shoring up the long-term viability of Jupiter's alternative water supply program. As the FDEP has recognized, the MFL will provide a source of dilution and mixing of the RO concentrate which will reduce the potential of violating current mixing zone limitations established by the FDEP. Given that the MFL statute is intended to prevent significant harm to water resources or ecology of the area, the MFL proposed

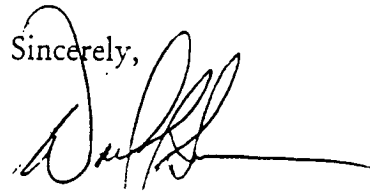
Kathy LaMartina

June 27, 2001

Page 2

for the Southwest Fork is truly warranted and prudent. To verify this, one only has to revisit the fresh water supply dilemma experienced in the drought of 1990-91 compared to that of 2000-01. The vast ecological benefit of Jupiter's alternative water supply program can be easily seen through the greater availability of fresh water resources for the local environment during dry periods.

Sincerely,



David L. Brown  
Director of Utilities

DLB:pap

cc: Ken Ammon/SFWMD  
Matthew Morrison/SFWMD  
Shannon LaRocque/File

K:\Water\Mngmt\DAVID\LETTERS\SFWMD\LaMartina.ltr.wpd

**GEROLYN A. JENKINS**  
813 Hummingbird Way, #6A  
North Palm Beach, FL 33408  
(561) 863-6641

July 4, 2001

**VIA FACSIMILE 682-6200**

Henry Dean,  
Executive Director  
South Florida Water Management District  
P. O. Box 24680  
West Palm Beach, FL 33416

***RE: Public Board Meeting, July 12, 2001 at 1:00 p.m.***

Dear Mr. Dean:

I am writing as a very concerned citizen, a native of Florida and over two hundred year family history in Florida.

I understand that at this upcoming meeting you will be deciding whether to allow Golf Digest and Seacoast Utilities to legally proceed with the diversion of 22 million gallons of water a day from the Loxahatchee Slough and the C-18 canal which they have been illegally doing for the past 10-15 years. This would not only permanently destroy our ecosystem and environment, but also pose a serious threat to our wildlife – and only to supply lake front property golf community for million dollars homes, and transfer water to Seacoast Well Fields to save them money.

The Loxahatchee River will dry up if this is allowed to occur, and it is the only Federally designated wild and scenic river in Florida. No water has gone over the Lainhart dam for more than 5 months until the recent rains, and freshwater inflows are so low that salt water now invades up the river beyond Kitchen Creek. Cypress tree and the flood plain are already dying in the upper river at an alarming rate.

Please stop this outrage and do not allow this diversion to continue or we will all suffer the consequences – and especially our children and their children. Please restore the Loxahatchee River with minimum flows of 220 cubic feet a second. Thank you for your consideration – I am not alone with these concerns.

Sincerely,

Gerolyn A. Jenkins



**Department of Environmental  
Resources Management**

3323 Belvedere Road, Building 502

West Palm Beach, FL 33406-1548

(561) 233-2400

Fax: (561) 233-2414

www.pbcgov.com

**Palm Beach County  
Board of County  
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Carol A. Roberts, Vice Chair

Karen T. Marcus

Mary McCarty

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Tony Mastrotti

Adelle L. Greene

**County Administrator**

John J. Wozniak

July 19, 2001

Ms. Kathy LaMartina, Program Manager  
District-wide MFL Program  
South Florida Water Management District  
P.O. Box 24680  
3301 Gun Club Road  
West Palm Beach, FL 33416-4680

Dear Ms. LaMartina:

**SUBJECT: COMMENTS ON DRAFT REPORT ENTITLED "MINIMUM FLOWS  
AND LEVELS FOR THE LOXAHATCHEE RIVER AND ESTUARY"**

The Department of Environmental Resources Management (ERM) appreciates the opportunity to comment on the draft technical document describing the methods and technical criteria for developing minimum flows and levels (MFLs) for the Loxahatchee River and estuary. We support the District's efforts to reduce or prevent harm and restore the Loxahatchee River and estuary. Our comments are as follows:

Introduction and Background (page 1) - It would be helpful if the introduction and background explained the relationship between the establishment of MFLs and the requirements and goals of the Loxahatchee River National Wild and Scenic River Management Plan, the Loxahatchee River Watershed Action Plan, and the various state and federal laws affecting management of the Loxahatchee River.

Water Reservation Rules (page 9) - Water reservations rules to achieve the MFLs are to be drafted at some undetermined date in the future. The majority of the flows needed to satisfy the MFLs appear to be coming from the Loxahatchee Slough. We request that no water reservation rules be adopted until minimum (and maximum) flows and levels have been established for the Loxahatchee Slough. Some of the proposed strategies to provide MFL flows to the Loxahatchee River have the potential to cause significant harm to the Loxahatchee Slough. Although we strongly support efforts to provide minimum flows to the Loxahatchee River, it should not be accomplished at the expense of another valuable natural resource area.

Rainfall Data (page 12) - The rainfall data used are from 1982, and do not include more recent studies (for example, Dent 1997 - "Rainfall Variations in the Loxahatchee River Watershed"). The use of the most recent studies will become more critical when future versions of the salinity model that will include precipitation are run.

Tributary Information (page 15) - Cypress Creek does not drain Jupiter Farms or the Hungryland Slough.

History Information (pages 19 - 20) - The private Florida Coast Line Canal and Transportation Company dredged the 50-foot-wide Florida East Coast Canal between Jacksonville and Miami from 1890 to 1912. It was turned over to the federal government in the late 1920s, and was widened, deepened, straightened, and renamed the Atlantic Intracoastal Waterway in the early 1930s. The first Fort Jupiter was present on Pennock Point from 1838 to 1844, and the second Fort Jupiter was present north of Center Street from 1855 to 1860 (DuBois 1981- "The History of the Loxahatchee River"). Fort Jupiter was not present on Jupiter Island in the 1870s, and Henry Flagler was not active in Palm Beach County until the 1890s. The Florida East Coast Railroad bridge was constructed across the Loxahatchee River in 1894. Railroad service to West Palm Beach began in the fall of that year. The first bridge for present-day Alternate A1A was constructed in 1911 (Dubois 1981).

Land Use (pages 33 -34) - The table on page 33 does not include any conservation lands outside of Jonathan Dickinson State Park. The Jupiter Ridge Natural Area and the Juno Dunes Natural Area are in the Coastal subbasin; the Pal-Mar Natural Area and the Loxahatchee River Natural Area are in the Cypress/Pal-Mar subbasin; the Loxahatchee Slough Natural Area, the Hungryland Slough Natural Area, and the J. W. Corbett Wildlife Management Area are in the C-18/Corbett subbasin. These lands should be moved from the undeveloped land use category to the conservation category. The map on page 34 should not show an urban land use designation for unbuilt Unit 11 in the Acreage.

Water Catchment Area - The report is inconsistent in the treatment of the West Palm Beach Water Catchment Area (WCA). This area is not considered part of the Loxahatchee River watershed (pages 13 and 14), but the City of West Palm Beach is considered a major water user in the watershed (page 35). We recommend the following changes: 1) add the portion of the WCA north of Northlake Boulevard to the watershed, since this area currently drains into the Loxahatchee Slough; 2) do not add the WCA portions south of Northlake Boulevard to the watershed until sufficient improvements are made to provide a significant hydrological connection between the WCA and the Slough; and 3) do not include the City of West Palm Beach as a water user until a significant hydrological connection is established.

Water Supply (pages 35 - 36) - The urban water supply demands are significantly overstated by including permitted users outside the watershed. Besides the City of West Palm Beach, the City of Riviera Beach, the Town of Mangonia Park, Good Samaritan Hospital, PBC/Century Utilities, and Palm Beach County (2W, 8W) are all located outside the Loxahatchee River watershed in the C-17 Canal and Intracoastal drainage basins. The only urban users in the watershed are the Town of Jupiter, the Town of Tequesta, United Technologies, the Palm Beach Park of Commerce, and part of Seacoast Utilities. The report includes the total permit amount for Seacoast Utilities, which includes the Hood Road wellfield and the North Palm Beach, Burma Road, and Palm Beach Gardens wellfields. Only the numbers for the Hood Road wellfield, which is in the watershed, should be used. The three other wellfields are in the C-17 or Intracoastal watershed. If a significant hydrological connection to the WCA is established, then the City of West Palm Beach and other water suppliers dependent on recharge from the WCA could be added in the future.

Review of Aerial Photographs - The report contains several incorrect conclusions based on an analysis of the 1940 and 1995 aerial photographs. First, cypress trees are said to have disappeared because of less frequent inundation of the floodplain (page 80, page B-10). The report does not include the most obvious reason that cypress trees disappear - they are cut down. According to Dubois (1981, page 8), the entire Loxahatchee River was logged in 1941. This logging is referred to on pages 20 and 72 of the report. The



# Loxahatchee River District

2500 Jupiter park Drive, Jupiter, Florida 33458-8964  
Telephone (561) 747-5700 Fax (561) 747-9929  
e-mail: [osprey@loxahatcheeriver.org](mailto:osprey@loxahatcheeriver.org)

Richard C. Dent, Executive Director

Celebrating  
30 Years



*Award Winning  
Regional Wastewater Facility  
Best in Nation, E.P.A.  
Best in State, D.E.P.*

July 20, 2001

Mr. Matt Morrison  
South FL Water Mngmt District  
P.O. Box 24680  
West Palm Beach, FL 33416

Dear Matt:

Water quality monitoring activity was conducted in January, March and May of this year at over two dozen surface water sampling stations throughout the Loxahatchee River watershed. The District staff at the WildPine Ecological Laboratory completed the sampling and subsequent analytical work and the results are shown on the enclosed materials.

- .. Map of the Water Quality Sampling Stations
- .. Monthly Data Sheets showing all data recorded during each monitoring run
- .. 2001 Composite Index Sheet providing a summary of information for each segment of the watershed

From a hydrologic standpoint, January and May were reflective of conditions during the ongoing drought that has been with us for nearly 20 months, but March offered a slight difference with approximately three inches of rain falling in advance of the sampling event. For most of the first six months of this year, salinity concentrations were higher than normal for both the marine and estuarine portions of the watershed and color was lower in value than normal. Total nitrogen and total phosphorus tended to mirror the results from earlier in the 2000 drought and were substantially lower than in prior years.

The July sampling event was completed last week and, with the drought apparently over (9 inches of rain in June and above average for July), more characteristic values for salinity, color, the nutrients and other parameters are anticipated.

Personnel from the WildPine Lab will be conducting routine water quality monitoring in September and again in November. Please call Mary Ridler or Lorene Bachman if you would like

K-49

Loring E. "Snag" Holmes  
Board Member

Matt H. Rostock  
Board Member

Joseph O. Ellis  
Chairman

Richard C. Sheehan  
Board Member

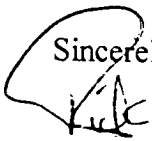
Sawyer Thompson, Jr.  
Board Member

Mr. Matt Morrison  
July 20, 2001  
Page Two  
. . . .

to join us on the river or have us examine something of particular interest to you. The Lab is also wrapping up two studies, one on seagrass communities and the other on metals and pesticides in western tributary waters. Results of these projects should be published in the next several months.

Please call with any questions or comments you may have on this report and thanks for your continued dedication to the river and its preservation.

Sincerely,

A handwritten signature in black ink, appearing to read "R. Dent", is written over a circular scribble.

Richard C. Dent  
Executive Director

Enclosures:

statement in the report that the cypress trees remain where the floodplain was wider (and the trees were harder to log since they had to be dragged farther to the river channel) indirectly supports this. The replacement of cypress by swamp hardwoods after logging has been well-documented elsewhere (such as in the Fakahatchee Strand). Mature canopy bald cypress trees will not disappear because of inundation changes, and are quite capable of surviving on dry land. The seedling recruitment phase is when cypress trees are sensitive to water levels. If the trees had died, the dead snags should still be present as the snags are down-river. The logging explanation can be verified by looking for stumps in the areas that cypress disappeared from, or by reviewing other aerial photographs such as the 1953 series available at the local Soil and Water Conservation District office. Second, the statement that slash pine and saw palmetto have invaded the floodplain (pages 79 and B-8) also does not consider the effects of logging. Virtually all of the pine flatwoods in Palm Beach County were logged in the 1920s and 1930s. Without trees, these areas would look like wet prairies in aerial photographs. The pine forest regrew and saw palmetto expanded when wildfires were suppressed. If the soil type is checked in these areas, it will be found to be typical of pine flatwoods and not wet prairie. The incorrect conclusions about vegetation changes are important because they are cited as reasons to support the MFL, when in fact all they demonstrate are the effects of logging. Finally, there were no citrus groves on the river prior to 1940 (pages 78 and B-6). The orange groves in Riverbend County Park, the Reese tract, and the Shunk tract were established around 1900 (Jackson 1978 - "Early History of Jupiter, Florida") and are visible in the 1940 photograph. Their presence is alluded to on page 35 of the report. The Bee Line Highway was present in 1940 (pages 78 and B-5). What was actually present was the Seaboard Airline Railroad (the present-day CSX Railroad). The Bee Line Highway was not constructed until the late 1950s.

Salinity/MFL Analysis - The conclusion of the analysis is that 50 cubic feet per second (cfs) across the Lainhart Dam is all that is needed to maintain the status quo. This amount of water holds the salinity wedge at river mile 8.6, which is in the dead cypress zone and below the zone of stressed and dying cypress (page 87). The proposed MFL is 70 cfs, which would hold the salinity wedge at river mile 8.1, which is below the junction with Kitching Creek, and a significant improvement over current conditions. The Department of Environmental Protection has indicated that a much greater flow will be needed to move the saltwater wedge downstream of Jonathan Dickinson State Park and restore the Loxahatchee River (T. Swihart letter to K. LaMartina, June 18, 2001). There are some indications that this improvement can only be achieved by taking actions that would damage the Loxahatchee Slough (taking too much water out, pumping too much water in). This relates to our first recommendation - that MFLs for the river should not be established until MFLs for the Loxahatchee Slough have been established. Damaging the slough in order to improve the river is not an acceptable tradeoff. Strategies need to be identified that will protect both resources and provide for the future restoration of the River.

Selection of Cypress as Indicator Species - The technical discussion in the report leads one to the conclusion that cypress trees are the key indicator of minimum flow levels and saltwater intrusion into the floodplain. However, other plant and animal species are more sensitive to very small changes in salt concentration for extended periods of time. We recommend that further review be conducted to ensure that a sufficient scientific basis exists for using cypress as the indicator species.

Modeling - General Comments (page 58) - There is some question as to whether the two-dimensional hydrological model used in the plan is suitable for use in predicting freshwater and saltwater inflows to the estuary and the response of the river to these flows. A three-dimensional model, such as that used by the U.S.

Army Corps of Engineers, may provide a more accurate prediction of the effects of saltwater intrusion on both the Northwest Fork and the North Fork of the Loxahatchee River.

Data from a 1982 U.S. Geological Survey study was used in the determination of surface freshwater inflows. We believe that these data are out of date and inaccurate. The watershed has undergone major changes in the last 20 years, including the development of new wellfields, the expansion of row crop agriculture, and construction of many residential housing developments, all of which have the potential to affect freshwater inflows. If more recent data is available it should be used in the inflow determinations. If it is not available, it may be appropriate to implement temporary measures to prevent further harm to the Loxahatchee River and delay the final adoption of MFLs until accurate flow data is available.

It is our understanding that the freshwater inflows from the North Fork of the Loxahatchee River were not included in the modeling runs. We believe that the North Fork should be included in all models and in the final rule because it plays a key role in providing freshwater inputs to the estuary.

Minimum Duration Requirement - The report recommends that the flows delivered to the Northwest Fork of the Loxahatchee River, as measured at the Lainhart Dam, not fall below 70 cfs for more than 20 consecutive days to protect the upstream cypress community against significant harm. The report, however, acknowledges that there is a lack of information concerning the ability of the saltwater wedge to penetrate the floodplain water table and the salinity level that will cause damage or mortality to cypress trees. The 20 day figure is recommended as a "placeholder" until better information becomes available. Since there is data that shows that under a reduced flow regime (e.g. from 65 to 35 cfs) for a 5 - 8 day time period, the saltwater wedge can move upstream a distance of approximately 1.0 - 1.5 river miles (report, p. 101), it would seem more prudent to establish a "placeholder" of 10 days or less.

Proposed Recovery Plan - Backpumping Into the Slough - It appears that pumps are proposed to be placed in the west leg of the C-18 Canal to backpump runoff water from the J. W. Corbett Wildlife Management Area into the Loxahatchee Slough. This action appears to be the mechanism to be used to achieve the 2020 projection that shows the slough permanently flooded, which will be very damaging to the slough. We request that this approach not be taken, and that an alternative approach be used - establishment of a stormwater impoundment along the west leg of the C-18 Canal on agricultural lands.

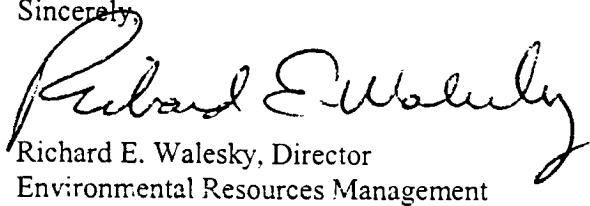
Proposed Recovery Plan - Groundwater Pumping Review - The report contains numerous references as to how lowered groundwater levels have affected freshwater flows to the river. However, there is no clearly stated objective to study the effects of pumping of groundwater for irrigation for the large-scale agricultural operations that border the river, or any commitment to reevaluate and possibly reduce the withdrawals when the consumption permits come up for renewal. As this process proceeds, the consumptive use permits for all currently supplied utilities should be reexamined. The review should include the sufficiency or feasibility of permit conditions restricting pumping during various levels of water restrictions. These actions should be added to the strategies to meet MFL needs.

Proposed Recovery Plan - Culvert Work - There are numerous existing culverts within the watershed that are in need of repair or replacement. Phase 1 of the Recovery Plan should include an evaluation of all existing culverts and repair/replacement as needed.

Kathy LaMartina  
July 19, 2001  
Page 5

Again, we thank you for the opportunity to comment on the report. If you have any questions regarding our comments, please contact me or Jon Van Arnam, Deputy Director at (561) 233-2400.

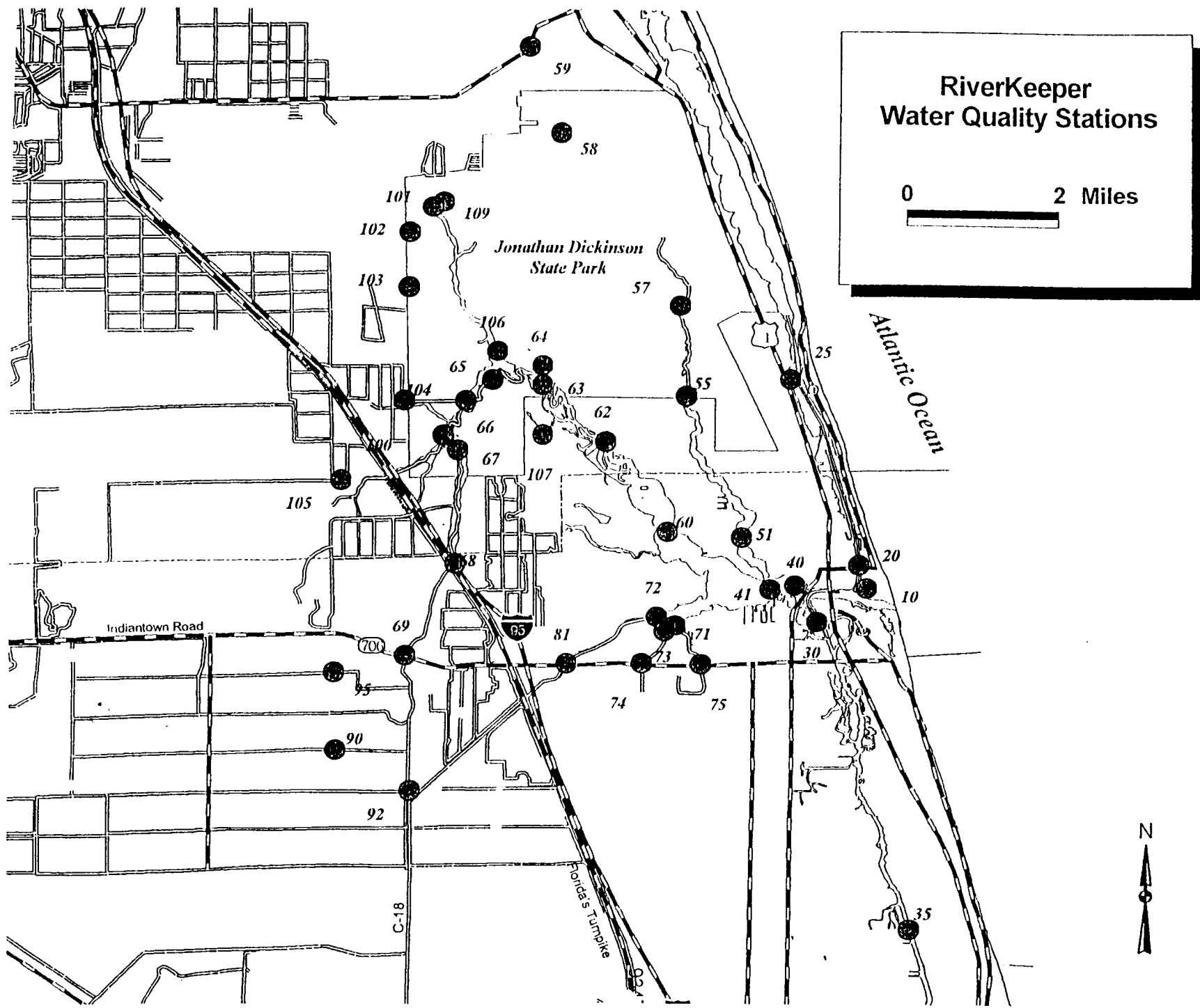
Sincerely,

A handwritten signature in black ink, appearing to read "Richard E. Walesky". The signature is fluid and cursive, with a large initial "R" and a long, sweeping underline.

Richard E. Walesky, Director  
Environmental Resources Management

REW:si

cc: Ken Todd, Water Resources Manager, Palm Beach County



Loxahatchee River District  
Riverkeeper Data  
January-2001

| SITE NAME              | SITE # | Date    | Time | Depth<br>Meters | Temp.<br>Deg. C | pH   | Alk.<br>mg/L | Tide<br>Stage | Cond.<br>umho/cm | Salinity<br>ppt | Secchi<br>Meters | Turb.<br>NTU | TSS<br>mg/L | Color<br>Units | DO<br>mg/L | DO<br>% | BOD<br>mg/L | F-Coli.<br>CFU/100ml | T-Coli.<br>CFU/100ml | Organic N<br>mg-N/L | Ammonia<br>mg-N/L | TKN<br>mg-N/L | NO2+NO3<br>mg-N/L | Total N<br>mg-N/L | Total P<br>mg-P/L | CHL A<br>mg/m <sup>3</sup> |
|------------------------|--------|---------|------|-----------------|-----------------|------|--------------|---------------|------------------|-----------------|------------------|--------------|-------------|----------------|------------|---------|-------------|----------------------|----------------------|---------------------|-------------------|---------------|-------------------|-------------------|-------------------|----------------------------|
| Jupiter Inlet          | 10     | 1/17/01 | 1020 | 0.5             | 22.11           | 7.69 | 122          | flood         | 52,829           | 35.0            | 1.5              | 4.01         | 10.5        | 10             | 6.68       | 93.7    | 1.4         | 5                    |                      | 0.41                | <0.05             | 0.41          | 0.016             | 0.426             | 0.013             | 1.90                       |
| ICW - S.R. 707         | 20     | 1/17/01 | 1125 | 0.5             | 22.50           | 7.98 | 119          | flood         | 54,137           | 35.9            | 2.0              | 3.46         | 4.6         | 10             | 6.90       | 97.8    | 0.9         | <2                   | 6                    | 0.46                | <0.05             | 0.46          | 0.011             | 0.471             | 0.012             | 1.11                       |
| ICW - M.M. 43          | 25     | 1/17/01 | 1100 | 0.5             | 21.03           | 7.87 | 123          | flood         | 53,348           | 35.2            | 1.0              | 4.61         | 7.3         | 10             | 7.27       | 100.9   | 0.8         | 10                   |                      |                     |                   | 0.42          | 0.012             | 0.432             | 0.017             | 2.24                       |
| ICW - S.R. 706         | 30     | 1/17/01 | 1145 | 0.5             | 21.70           | 7.87 | 126          | flood         | 50,521           | 33.1            | 1.4              | 3.84         | 5.3         | 20             | 6.77       | 93.0    | 1.5         | 18                   | 20                   | 0.46                | <0.05             | 0.46          | 0.015             | 0.475             | 0.012             | 1.60                       |
| ICW - D.Ross Rd.       | 35     | 1/17/01 | 945  | 0.5             | 20.14           | 7.60 | 128          | dh            | 49,524           | 32.5            | CTB              | 1.89         | 18.0        | 15             | 6.45       | 87.0    | 1.0         | 18                   | 34                   | 0.51                | <0.05             | 0.51          | 0.029             | 0.539             | 0.015             | 1.55                       |
| River RR Track         | 40     | 1/17/01 | 1200 | 0.5             | 22.73           | 7.95 | 122          | flood         | 53,717           | 35.6            | 1.3              | 4.84         | 12.0        | 10             | 7.04       | 98.9    | 1.6         | 4                    |                      |                     |                   | 0.31          | 0.012             | 0.322             | 0.020             | 1.60                       |
| NF - Tequesta Dr.      | 51     | 1/10/01 | 845  | 0.5             | 18.10           | 7.90 | 119          | flood         | 53,900           | 35.8            | 1.3              | 3.24         | 25.0        | 10             | 7.10       | 92.2    | 0.6         | <2                   | 20                   | 0.26                | <0.05             | 0.26          | 0.015             | 0.275             | 0.007             | 0.75                       |
| NF - Countyline Rd.    | 55     | 1/10/01 | 924  | 0.5             | 14.50           | 7.75 | 123          | dh            | 44,000           | 28.4            | CTB              | 4.82         | 12.0        | 30             | 7.60       | 87.5    | 1.5         | 82                   |                      | 0.54                | <0.05             | 0.54          | 0.015             | 0.555             | 0.022             | 3.51                       |
| NF - JD State Park     | 57     | 1/18/01 | 900  | 0.2             | 17.80           | 7.01 | 95           | fresh         | 309              |                 |                  | 1.41         | 4.6         | 125            | 0.86       | 9.1     | 1.8         | 48                   |                      |                     |                   | 0.50          | 0.017             | 0.517             | 0.045             | 2.42                       |
| NF - Powerline Rd.     | 58     | 1/18/01 | 815  | 0.1             | 15.40           | 6.84 | 18           | fresh         | 176              |                 |                  | 0.79         | 4.0         | 250            | 1.51       | 15.1    | 2.4         | 76                   |                      |                     |                   | 2.07          | 0.008             | 2.078             | 0.023             | 5.69                       |
| NF - Bridge Rd.        | 59     | 1/18/01 | 1000 | 0.2             | 13.50           | 6.57 | 68           | fresh         | 233              |                 |                  | 1.47         | 4.0         | 250            | 0.40       | 3.7     | 1.6         | 124                  |                      |                     |                   | 0.81          | 0.007             | 0.817             | 0.014             | 4.00                       |
| NWF - Bay              | 60     | 1/11/01 | 930  | 0.5             | 18.19           | 7.90 | 126          | flood         | 52,491           | 34.3            | CTB              | 2.60         | 6.0         | 15             | 7.30       | 94.9    | 1.0         | 6                    |                      |                     |                   | 0.39          | 0.013             | 0.403             | 0.014             | 1.74                       |
| NWF - Bay              | 60     | 1/11/01 | 935  | 1.3             | 18.80           | 7.94 |              | flood         | 53,795           | 35.6            |                  |              |             |                | 7.04       | 94.7    |             |                      |                      |                     |                   |               |                   |                   |                   |                            |
| NWF - Islandway        | 62     | 1/11/01 | 940  | 0.5             | 16.93           | 7.85 | 137          | flood         | 45,309           | 29.4            | 1.6              | 2.58         | 6.0         | 20             | 7.31       | 91.4    | 0.2         | 26                   | 100                  | 0.39                | <0.05             | 0.39          | 0.010             | 0.400             | 0.018             | 3.68                       |
| NWF - Islandway        | 62     | 1/11/01 | 945  | 3.6             | 16.98           | 7.89 |              | flood         | 45,992           | 29.9            |                  |              |             |                | 7.01       | 87.8    |             |                      |                      |                     |                   |               |                   |                   |                   |                            |
| NWF - Osprey Nest      | 63     | 1/11/01 | 955  | 0.5             | 16.24           | 7.80 | 161          | flood         | 32,450           | 20.4            | 1.3              | 1.73         | 4.9         | 30             | 7.04       | 81.5    | 0.8         | 100                  |                      |                     |                   | 0.76          | 0.019             | 0.779             | 0.039             | 2.47                       |
| NWF - Osprey Nest      | 63     | 1/11/01 | 1000 | 3.6             | 16.53           | 7.78 |              | flood         | 36,800           | 23.6            |                  |              |             |                | 6.80       | 80.6    |             |                      |                      |                     |                   |               |                   |                   |                   |                            |
| NWF - JD Park Beach    | 64     | 1/11/01 | 1005 | 0.5             | 16.09           | 7.73 | 170          | flood         | 29,313           | 18.1            | 1.2              | 2.52         | 7.0         | 30             | 7.67       | 87.6    | 0.9         | 60                   |                      |                     |                   | 0.75          | 0.020             | 0.770             | 0.031             | 2.80                       |
| NWF - JD Park Beach    | 64     | 1/11/01 | 1010 | 2.8             | 16.44           | 7.72 |              | flood         | 33,433           | 20.9            |                  |              |             |                | 6.70       | 78.4    |             |                      |                      |                     |                   |               |                   |                   |                   |                            |
| NWF - Kitching Cr.     | 65     | 1/11/01 | 1020 | 0.5             | 15.28           | 7.79 | 202          | flood         | 14,356           | 8.4             | 1.2              | 1.69         | 4.0         | 40             | 7.66       | 81.3    | 0.7         | 200                  |                      |                     |                   | 0.83          | 0.032             | 0.862             | 0.031             | 2.17                       |
| NWF - Kitching Cr.     | 65     | 1/11/01 | 1025 | 3.0             | 16.12           | 7.66 |              | flood         | 24,355           | 14.8            |                  |              |             |                | 6.61       | 73.2    |             |                      |                      |                     |                   |               |                   |                   |                   |                            |
| NWF - Hobe Groves      | 66     | 1/11/01 | 1045 | 0.5             | 14.88           | 7.80 | 211          | flood         | 4,468            | 2.5             | 1.8              | 2.11         | 4.0         | 50             | 7.24       | 72.8    | 0.8         | 120                  |                      |                     |                   | 0.71          | 0.036             | 0.746             | 0.040             | 4.35                       |
| NWF - Hobe Groves      | 66     | 1/11/01 | 1050 | 4.4             | 14.86           | 7.82 |              | flood         | 5,199            | 2.9             |                  |              |             |                | 7.34       | 74.2    |             |                      |                      |                     |                   |               |                   |                   |                   |                            |
| NWF - Trapper's        | 67     | 1/11/01 | 1105 | 0.5             | 14.90           | 7.89 | 222          | fresh         | 810              | 0.4             | CTB              | 1.52         | 4.0         | 50             | 7.56       | 74.8    | 0.9         | 138                  |                      |                     |                   | 0.83          | 0.056             | 0.886             | 0.035             | 3.14                       |
| NWF - I - 95           | 68     | 1/11/01 | 1035 | 0.5             | 14.97           | 7.75 | 235          | fresh         | 765              |                 | CTB              | 2.43         | 4.0         | 50             | 8.09       |         | 1.9         | 74                   |                      |                     |                   | 0.55          | 0.086             | 0.636             | 0.021             | 0.77                       |
| NWF - S.R. 706         | 69     | 1/11/01 | 1050 | 0.5             | 15.10           | 7.71 | 235          | fresh         | 756              |                 | CTB              | 1.26         | 5.3         | 50             | 7.84       |         | 0.7         | 20                   | 140                  |                     |                   | 0.55          | 0.062             | 0.612             | 0.019             | 1.36                       |
| SF - Jones Cr.         | 71     | 1/10/01 | 1017 | 0.5             | 16.31           | 7.90 | 127          | dh            | 51,000           | 33.6            | 1.4              | 4.37         | 4.6         | 20             | 7.75       | 89.5    | 0.6         | 24                   |                      |                     |                   | 0.34          | 0.015             | 0.355             | 0.020             | 2.27                       |
| SF - Lox. Riv. Rd.     | 72     | 1/10/01 | 952  | 0.5             | 16.00           | 7.83 | 126          | dh            | 50,650           | 33.4            | 1.6              | 3.57         | 8.0         | 20             | 7.09       | 84.4    | 0.9         | 24                   | 80                   | 0.53                | 0.07              | 0.60          | 0.020             | 0.620             | 0.026             | 3.57                       |
| SF - Sim's Cr.         | 73     | 1/10/01 | 1005 | 0.5             | 15.60           | 7.87 | 127          | dh            | 50,400           | 33.2            | 1.4              | 3.79         | 11.0        | 20             | 7.45       | 86.4    | 0.5         | 62                   |                      |                     |                   | 0.54          | 0.020             | 0.560             | 0.022             | 3.34                       |
| C18 - S.P. 706         | 81     | 1/11/01 | 1205 | 0.5             | 15.89           | 8.20 | 162          | fresh         | 475              |                 | CTB              | 1.49         | 3.3         | 60             | 9.12       |         | 0.9         | 18                   |                      |                     |                   | 0.68          | 0.007             | 0.687             | 0.020             | 3.09                       |
| C14 - D. stream of G92 | 92     | 1/11/01 | 1145 | 0.5             | 16.45           | 7.76 | 235          | fresh         | 683              |                 | CTB              | 1.38         | 4.0         | 55             | 7.66       |         | 1.5         | 4                    |                      | 0.73                | 0.08              | 0.81          | 0.051             | 0.861             | 0.031             | 18.85                      |
| Canal -1- J.Farms      | 95     | 1/11/01 | 1155 | 0.5             | 14.40           | 7.69 | 220          | fresh         | 744              |                 | CTB              | 1.69         | 5.3         | 50             | 9.67       |         | 1.9         | 92                   |                      | 0.47                | 0.06              | 0.53          | 0.025             | 0.555             | 0.020             | 8.32                       |
| Cypress - NWF          | 100    | 1/11/01 | 1055 | 0.5             | 14.85           | 8.09 | 220          | fresh         | 824              | 0.4             | CTB              | 1.64         | 3.3         | 50             | 7.64       | 76.0    | 0.4         | 180                  |                      |                     |                   | 0.71          | 0.054             | 0.764             | 0.032             | 2.40                       |
| Jenkins Canal          | 101    | 1/18/01 | 1030 | 0.2             | 18.50           | 6.33 | 235          | fresh         | 599              |                 |                  | 0.70         | 3.3         | 60             | 0.44       | 4.6     | 1.7         | 36                   |                      |                     |                   | 1.03          | 0.084             | 1.114             | 0.048             | 1.95                       |
| Hobe Grove Canal       | 104    | 1/11/01 | 1110 | 0.5             | 15.41           | 8.09 | 196          | ebb           | 1,166            |                 | CTB              | 1.64         | 4.0         | 40             | 11.20      |         | 1.0         | 78                   |                      |                     |                   | 1.16          | <0.006            | 1.160             | 0.017             | 1.78                       |
| Cypress -Grove Canal   | 105    | 1/11/01 | 1120 | 0.5             | 15.45           | 7.65 | 217          | fresh         | 835              |                 | CTB              | 4.14         | 6.0         | 50             | 8.63       |         | 1.0         | 48                   |                      |                     |                   | 0.75          | 0.039             | 0.789             | 0.027             | 2.43                       |
| Kitching Creek         | 106    | 1/18/01 | 925  | 0.2             | 18.60           | 6.87 | 232          | fresh         | 349              |                 |                  | 1.95         | 4.0         | 55             | 3.45       | 37.1    | 1.9         | 480                  |                      |                     |                   | 1.75          | 0.017             | 1.767             | 0.066             | 8.12                       |
| River's Edge Slough    | 107    | 1/11/01 | 1010 | 0.5             | 17.52           | 7.39 | 165          | flood         | 33,700           | 21.1            | CTB              | 3.43         | 4.3         | 55             | 5.84       |         | 1.3         | 340                  |                      |                     |                   | 0.95          | 0.033             | 0.983             | 0.094             | 1.99                       |
| Kitching Creek North   | 109    | 1/18/01 | 1045 | 0.2             | 18.30           | 6.78 | 303          | fresh         | 805              |                 |                  | 10.90        | 6.7         | 100            | 0.90       | 9.6     | 2.2         | 4,160*               |                      |                     |                   | 0.52          | 0.013             | 0.533             | 0.099             | 2.27                       |

\*estimated

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| SITE NAME                  | SITE # | Date    | Time | Depth<br>Meters | Temp.<br>Deg. C | pH<br>Units | Ald.<br>mg/ L | Tide<br>Stage | Cond.<br>umho/cm | Salinity<br>ppt | Secchi<br>Meters | Turb.<br>NTU | TSS<br>mg/L | Color<br>Units | DO<br>mg/L | DO<br>% | BOD<br>mg/L | F-Coli.<br>CFU/100ml | T-Coli.<br>CFU/100ml | Organic N<br>mg-N/ L | Ammonia<br>mg-N/ L | TKN<br>mg-N/ L | NO2+NO3<br>mg-N/ L | Total N<br>mg-N/ L | Total P<br>mg-P/ L | CHL A<br>mg/m <sup>3</sup> | Light %<br>at 1M | Light %<br>at 2M | Total Hard<br>mg/L CaC. |  |
|----------------------------|--------|---------|------|-----------------|-----------------|-------------|---------------|---------------|------------------|-----------------|------------------|--------------|-------------|----------------|------------|---------|-------------|----------------------|----------------------|----------------------|--------------------|----------------|--------------------|--------------------|--------------------|----------------------------|------------------|------------------|-------------------------|--|
| Jupiter Inlet              | 10     | 3/21/01 | 1200 | 0.5             | 21.83           | 7.67        | 116           | ebb           | 50,000           | 32.2            | 0.7              | 5.32         | 12.5        | 10             | 7.17       |         | 1.1         | 4                    |                      | 0.65                 | <0.05              | 0.65           | 0.018              | 0.668              | 0.024              | 3.45                       |                  |                  |                         |  |
| ICW - S.R. 707             | 20     | 3/21/01 | 1145 | 0.5             | 21.86           | 7.69        | 117           | ebb           | 51,100           | 33.8            | 1.1              | 5.03         | 7.3         | 10             | 7.31       |         | 1.2         | <2                   | 6                    | 0.57                 | <0.05              | 0.57           | 0.006              | 0.578              | 0.012              | 2.87                       |                  |                  |                         |  |
| ICW - M.M. 43              | 25     | 3/21/01 | 1115 | 0.5             | 22.80           | 7.64        | 119           | ebb           | 50,200           | 33.0            | 1.3              | 4.80         | 5.3         | 15             | 6.54       |         | 1.1         | <1                   |                      |                      |                    | 0.86           | 0.010              | 0.870              | 0.014              | 2.09                       |                  |                  |                         |  |
| ICW - S.R. 706             | 30     | 3/21/01 | 1220 | 0.5             | 22.94           | 7.45        | 115           | ebb           | 45,400           | 29.4            | 1.2              | 4.06         | 9.3         | 25             | 6.15       |         | 1.2         | 76                   | 84                   | 0.77                 | <0.05              | 0.77           | 0.057              | 0.827              | 0.019              | 2.17                       |                  |                  |                         |  |
| ICW - D.Ross Rd.           | 35     | 3/21/01 | 950  | 0.5             | 22.80           | 7.22        | 117           | ebb           | 37,000           | 23.3            | CTB              | 4.49         | 15.0        | 60             | 5.65       |         | 2.4         | 336*                 | TNTC                 | 0.97                 | <0.05              | 0.97           | 0.062              | 1.032              | 0.048              | 2.38                       |                  |                  |                         |  |
| River RR Track             | 40     | 3/21/01 | 1230 | 0.5             | 22.23           | 7.64        | 120           | ebb           | 47,700           | 31.1            | 1.1              | 5.51         | 7.3         | 20             | 7.27       |         | 2.2         | 5                    |                      |                      |                    | 0.72           | 0.010              | 0.730              | 0.022              | 2.83                       |                  |                  |                         |  |
| NF - Tequesta Dr.          | 51     | 3/14/01 | 1330 | 0.5             | 25.07           | 7.87        | 121           | flood         | 51,500           | 34.0            | 1                | 4.95         | 4.6         | 25             | 6.92       | 102.0   | 1.8         | 22                   | 700                  | 0.76                 | <0.05              | 0.76           | <0.006             | 0.760              | 0.017              | 3.25                       | 34               |                  |                         |  |
| NF - Countyline Rd.        | 55     | 3/14/01 | 1305 | 0.5             | 25.57           | 7.65        | 122           | flood         | 44,952           | 28.9            | 0.5              | 6.75         | 9.3         | 50             | 5.72       | 81.6    | 1.3         | 40                   |                      | 1.09                 | <0.05              | 1.09           | <0.006             | 1.090              | 0.056              | 8.57                       |                  |                  |                         |  |
| NF - JD State Park         | 57     | 3/15/01 | 755  | 0.2             | 22.20           | 6.97        | 75            | fresh         | 318              |                 |                  | 4.89         | 7.0         | 110            | 1.68       | 19.4    | 5.1         | 45                   |                      |                      |                    | 1.17           | 0.016              | 1.186              | 0.058              | 11.38                      |                  |                  |                         |  |
| NF - Bridge Rd.            | 59     | 3/15/01 | 925  | 0.2             | 21.00           | 6.91        | 98            | fresh         | 302              |                 |                  | 2.84         | 4.6         | 140            | 2.13       | 24.0    | 3.3         | 46                   |                      |                      |                    | 1.73           | 0.024              | 1.754              | 0.108              | 42.06                      |                  |                  |                         |  |
| NWF - Bay                  | 60     | 3/22/01 | 835  | 0.5             | 19.70           | 7.57        | 127           | ebb           | 42,200           | 26.0            | 1.5              | 2.38         | 7.3         | 20             | 7.36       |         | 0.6         | 10                   |                      |                      |                    | 1.04           | 0.023              | 1.063              | 0.031              | 1.68                       | 26               |                  |                         |  |
| NWF - Bay                  | 60     | 3/22/01 | 835  | 2.1             | 20.47           | 7.66        |               | ebb           | 48,300           | 31.5            |                  |              |             |                | 7.29       |         |             |                      |                      |                      |                    |                |                    |                    |                    |                            |                  |                  |                         |  |
| NWF - Islandway            | 62     | 3/22/01 | 855  | 0.5             | 19.84           | 7.45        | 142           | ebb           | 30,600           | 18.8            | 1.6              | 2.62         | 10.0        | 30             | 6.71       |         | 1.3         | 38                   | 120                  | 1.43                 | 0.05               | 1.48           | 0.031              | 1.511              | 0.040              | 2.12                       | 28               | 8                |                         |  |
| NWF - Islandway            | 62     | 3/22/01 | 855  | 5.5             | 21.18           | 7.55        |               | ebb           | 43,100           | 27.7            |                  |              |             |                | 6.06       |         |             |                      |                      |                      |                    |                |                    |                    |                    |                            |                  |                  |                         |  |
| NWF - Osprey Nest          | 63     | 3/22/01 | 912  | 0.5             | 19.99           | 7.34        | 150           | ebb           | 18,900           | 11.0            | 1.4              | 1.89         | 8.0         | 40             | 6.35       |         | 1.0         | 50                   |                      |                      |                    | 1.31           | 0.053              | 1.363              | 0.056              | 2.57                       | 21               | 5                |                         |  |
| NWF - Osprey Nest          | 63     | 3/22/01 | 912  | 3.6             | 22.14           | 7.35        |               | ebb           | 36,300           | 22.9            |                  |              |             |                | 5.20       |         |             |                      |                      |                      |                    |                |                    |                    |                    |                            |                  |                  |                         |  |
| NWF - JD Park Beach        | 64     | 3/22/01 | 925  | 0.5             | 20.38           | 7.56        | 155           | ebb           | 11,180           | 6.1             | 1.8              | 2.27         | 4.0         | 40             | 6.23       |         | 2.0         | 58                   |                      |                      |                    | 1.79           | 0.080              | 1.870              | 0.066              | 3.68                       | 24               | 4                |                         |  |
| NWF - JD Park Beach        | 64     | 3/22/01 | 925  | 4.4             | 22.99           | 7.25        |               | ebb           | 32,000           | 19.9            |                  |              |             |                | 4.35       |         |             |                      |                      |                      |                    |                |                    |                    |                    |                            |                  |                  |                         |  |
| NWF - Kitching Cr.         | 65     | 3/22/01 | 935  | 0.5             | 20.72           | 7.81        | 156           | ebb           | 7,630            | 3.9             | 1.7              | 1.37         | 4.6         | 50             | 5.90       |         | 2.0         | 55                   |                      |                      |                    | 1.62           | 0.125              | 1.745              | 0.076              | 5.55                       | 26               | 6                |                         |  |
| NWF - Kitching Cr.         | 65     | 3/22/01 | 935  | 4.0             | 21.60           | 7.28        |               | ebb           | 29,500           | 18.1            |                  |              |             |                | 3.94       |         |             |                      |                      |                      |                    |                |                    |                    |                    |                            |                  |                  |                         |  |
| NWF - Hobe Groves          | 66     | 3/22/01 | 1010 | 0.5             | 20.34           | 7.97        | 160           | fresh         | 853              |                 | 1.8              | 3.86         | 4.6         | 55             | 6.36       |         | 1.6         | 60                   |                      |                      |                    | 1.56           | 0.209              | 1.769              | 0.066              | 4.73                       | 18               |                  |                         |  |
| NWF - Hobe Groves          | 66     | 3/22/01 | 1010 | 2.9             | 20.32           | 7.69        |               | fresh         | 854              |                 |                  |              |             |                | 6.07       |         |             |                      |                      |                      |                    |                |                    |                    |                    |                            |                  |                  |                         |  |
| NWF - Hobe Groves          | 66     | 3/20/01 | 1050 | 0.5             | 22.45           | 6.70        | 149           | fresh         | 872              |                 | 1.2              | 3.11         | 4.0         | 40             | 6.30       |         | 0.9         | 280                  |                      | 1.59                 | 0.10               | 1.69           | 0.062              | 1.752              | 0.087              | 5.38                       |                  |                  |                         |  |
| NWF - Trapper's            | 67     | 3/22/01 | 1045 | 0.5             | 19.75           | 7.67        | 183           | fresh         | 700              |                 | CTB              | 1.39         | 4.6         | 50             | 5.51       |         | 2.6         | 76                   |                      |                      |                    | 0.99           | 0.163              | 1.153              | 0.054              | 0.99                       | 40               |                  |                         |  |
| NWF - I-95                 | 68     | 3/22/01 | 1110 | 0.5             | 20.40           | 7.29        | 194           | fresh         | 641              |                 | CTB              | 2.93         | 3.3         | 50             | 6.38       | 70.9    | 0.6         | 68                   |                      |                      |                    | 1.48           | 0.201              | 1.581              | 0.040              | 1.83                       |                  |                  |                         |  |
| NWF - S.R. 706             | 69     | 3/22/01 | 1100 | 0.5             | 20.40           | 7.12        | 203           | fresh         | 653              |                 | CTB              | 2.81         | 5.3         | 45             | 5.63       | 62.7    | 1.5         | 20                   | 400                  |                      |                    | 1.08           | 0.208              | 1.288              | 0.027              | 2.33                       |                  |                  |                         |  |
| NWF - S.R. 706             | 69     | 3/20/01 | 930  | 0.5             | 22.54           | 7.22        | 178           | fresh         | 664              |                 | CTB              | 5.01         | 4.6         | 40             | 4.58       |         | 1.6         | 118                  |                      | 0.93                 | 0.08               | 1.01           | 0.137              | 1.147              | 0.036              | 2.79                       |                  |                  |                         |  |
| SF - Jones Cr.             | 71     | 3/14/01 | 1245 | 0.5             | 24.81           | 7.87        | 121           | flood         | 51,832           | 34.1            | 0.9              | 6.34         | 14.0        | 20             | 7.23       | 105.0   | 0.5         | 2                    |                      |                      |                    | 0.89           | <0.006             | 0.890              | 0.026              | 7.59                       | 56               |                  |                         |  |
| SF - Lox. Riv. Rd.         | 72     | 3/14/01 | 1215 | 0.5             | 25.31           | 7.78        | 120           | flood         | 50,374           | 33.1            | 0.9              | 4.50         | 8.0         | 20             | 6.63       | 97.6    | 0.8         | 8                    | 700                  | 1.03                 | <0.05              | 1.03           | <0.006             | 1.030              | 0.027              | 9.39                       | 44               | 8                |                         |  |
| SF - Sim's Cr.             | 73     | 3/14/01 | 1230 | 0.5             | 25.31           | 7.79        | 124           | flood         | 50,304           | 32.9            | 0.8              | 5.80         | 10.0        | 25             | 6.58       | 92.1    | 1.0         | 10                   |                      |                      |                    | 1.09           | 0.006              | 1.096              | 0.032              | 11.69                      |                  |                  |                         |  |
| C18 - S.R. 706             | 81     | 3/22/01 | 1125 | 0.5             | 23.80           | 7.69        | 194           | fresh         | 582              |                 |                  | 3.91         | 4.0         | 50             | 9.00       | 106.8   | 1.6         | 74                   |                      |                      |                    | 1.08           | 0.012              | 1.092              | 0.014              | 2.46                       |                  |                  |                         |  |
| C18 - S. of G92-154        | 82     | 3/20/01 | 1145 | 0.5             | 23.90           | 7.61        | 226           | fresh         | 645              |                 | 0.5              | 2.17         | 2.9         | 50             | 7.33       |         | 2.6         | 79                   |                      | 1.00                 | <0.05              | 1.00           | 0.084              | 1.084              | 0.015              | 2.78                       |                  |                  |                         |  |
| C14 - D. stream of G92     | 92     | 3/22/01 | 1020 | 0.5             | 21.00           | 6.57        | 218           | fresh         | 679              |                 |                  | 1.80         | 2.0         | 50             | 5.83       | 66.0    | 1.5         | 32                   |                      |                      |                    | 0.11           | 1.26               | 0.105              | 1.365              | 0.024                      | 1.29             |                  |                         |  |
| Canal -1- J.Farms          | 95     | 3/22/01 | 1030 | 0.5             | 18.10           | 6.85        | 157           | fresh         | 544              |                 |                  | 2.97         | 5.3         | 40             | 6.61       | 70.3    | 1.3         | 75                   |                      | 0.89                 | <0.05              | 0.89           | 0.010              | 0.900              | 0.043              | 4.65                       |                  |                  |                         |  |
| Canal -1- J.Farms          | 95     | 3/20/01 | 1205 | 0.5             | 23.38           | 7.39        | 166           | fresh         | 618              |                 | CTB              | 2.39         | 4.3         | 50             | 6.52       |         | 1.5         | 220                  |                      | 0.77                 | 0.06               | 0.83           | 0.022              | 0.852              | 0.059              | 3.47                       |                  |                  |                         |  |
| Cypress - NWF              | 100    | 3/22/01 | 1035 | 0.5             | 19.77           | 7.96        | 157           | flood         | 737              |                 | CTB              | 2.19         | 2.0         | 55             | 7.33       |         | 1.0         | 74                   |                      |                      |                    | 1.82           | 0.222              | 2.042              | 0.101              | 2.13                       | 26               |                  |                         |  |
| Jenkins Canal              | 101    | 3/20/01 | 1000 | 0.2             | 19.90           | 6.49        | 174           | flood         | 550              |                 |                  | 7.47         | 15.0        | 140            | 0.22       | 25.0    | 2.6         | 220                  |                      |                      |                    | 1.49           | 0.006              | 1.496              | 0.122              | 20.83                      |                  |                  |                         |  |
| Hobe Grove Canal           | 104    | 3/22/01 | 950  | 0.5             | 20.70           | 6.77        | 145           | fresh         | 773              |                 |                  | 1.65         | 3.6         | 55             | 7.03       | 78.6    | 1.4         | 54                   |                      |                      |                    | 2.00           | 0.194              | 2.194              | 0.047              | 4.45                       |                  |                  |                         |  |
| Hobe Grove Canal           | 104    | 3/20/01 | 1015 | 0.5             | 23.61           | 7.27        | 134           | ebb           | 1,022            |                 | CTB              | 7.91         | 6.0         | 50             | 7.91       |         | 0.7         | 220                  |                      | 1.41                 | 0.05               | 1.46           | 0.008              | 1.468              | 0.031              | 5.29                       |                  |                  |                         |  |
| Cypress -Grove Canal       | 105    | 3/22/01 | 1005 | 0.5             | 20.10           | 6.84        | 164           | fresh         | 681              |                 |                  | 2.43         | 3.3         | 55             | 5.96       | 65.7    | 1.6         | 18                   |                      |                      |                    | 1.61           | 0.205              | 1.815              | 0.110              | 2.13                       |                  |                  |                         |  |
| Cypress -Grove Canal       | 105N   | 3/20/01 | 1000 | 0.5             | 22.53           | 7.18        | 158           | fresh         | 790              |                 | 0.5              | 3.69         | 2.7         | 50             | 5.81       |         | 0.9         | 113                  |                      | 1.13                 | 0.06               | 1.19           | 0.270              | 1.480              | 0.074              | 3.49                       |                  |                  |                         |  |
| Cypress - Golf Canal       | 105W   | 3/20/01 | 1045 | 0.5             | 22.51           | 6.95        | 215           | ebb           | 1,029            |                 | 0.5              | 1.36         | 2.7         | 55             | 1.77       |         | 1.6         | 35                   |                      | 1.04                 | <0.05              | 1.04           | <0.006             | 1.040              | 0.037              | 2.78                       |                  |                  |                         |  |
| Kitching Creek             | 106    | 3/15/01 | 835  | 0.2             | 22.90           | 7.12        | 217           | flood         | 8,657            |                 |                  | 1.62         | 3.3         | 50             | 2.35       | 27.5    | 0.8         | 180                  |                      |                      |                    | 1.48           | 0.018              | 1.498              | 0.093              | 8.22                       |                  |                  |                         |  |
| River's Edge Slough        | 107    | 3/22/01 | 930  | 0.5             | 23.00           | 7.10        | 156           | ebb           | 12,889           |                 |                  | 2.77         | 6.7         | 50             | 4.20       | 48.0    | 1.9         | 300                  |                      |                      |                    | 1.19           | 0.038              | 1.228              | 0.151              | 8.18                       |                  |                  |                         |  |
| Kitching Creek North       | 109    | 3/15/01 | 1020 | 0.2             | 21.30           | 7.02        | 295           | fresh         | 759              |                 |                  | 12.4         | 23.0        | 100            | 1.79       | 20.3    | 3.5         | 56                   |                      |                      |                    | 1.88           | <0.006             | 1.880              | 0.288              | 134.50                     |                  |                  |                         |  |
| St. Lucie Canal Background | 200    | 3/20/01 | 1125 | 0.5             | 23.04           | 7.36        | 156           | fresh         | 700              |                 | 0.5              | 9.13         | 11.0        | 50             | 5.83       |         | 1.3         | 4                    |                      | 1.29                 | 0.17               | 1.46           | 0.124              | 1.584              | 0.075              | 10.15                      |                  |                  |                         |  |
| Palm-Mar Background        | 201    | 3/20/01 | 1110 | 0.5             | 27.66           | 6.56        | 23            | fresh         | 322              |                 | CTB              | 2.13         | 3.3         | 120            | 6.22       |         | 3.2         | 870                  |                      | </                   |                    |                |                    |                    |                    |                            |                  |                  |                         |  |

\*estimate



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Riverkeeper Data  
May-2001

| SITE NAME              | SITE # | Date Time    | Depth<br>Meters | Temp.<br>Deg. C | pH   | Alki.<br>mg/ L | Tide<br>Stage | Cond.<br>umho/cm | Salinity<br>ppt | Secchi<br>Meters | Turb.<br>NTU | TSS<br>mg/ L | Color<br>Units | DO<br>mg/ L | DO<br>% | BOD<br>mg/ L | F-Coll.<br>CFU/100ml | T-Coll.<br>CFU/100ml | Organic N<br>mg- N/ L | Ammonia<br>mg- N/ L | TKN<br>mg- N/ L | NO2+NO3<br>mg- N/ L | Total N<br>mg- N/ L | Total P<br>mg- P/ L | CHL A<br>mg/ m3 | Light %<br>at 1M | Light %<br>at 2M |
|------------------------|--------|--------------|-----------------|-----------------|------|----------------|---------------|------------------|-----------------|------------------|--------------|--------------|----------------|-------------|---------|--------------|----------------------|----------------------|-----------------------|---------------------|-----------------|---------------------|---------------------|---------------------|-----------------|------------------|------------------|
| Jupiter Inlet          | 10     | 5/18/01 1010 | 0.5             | 25.45           | 7.79 | 109            | ebb           | 52,220           | 34.6            | 1.5              | 3.50         | 4.8          | 5              | 6.14        | 92.4    | 1.3          | 6                    |                      | 0.80                  | <0.05               | 0.80            | 0.010               | 0.81                | 0.015               | 1.7             | 56               | 26               |
| ICW - S.R. 707         | 20     | 5/18/01 1020 | 0.5             | 25.40           | 7.87 | 107            | ebb           | 54,400           | 36.1            | 2.9              | 1.70         | 2.6          | 5              | 6.22        | 94.7    | 1.2          | 4                    | 42                   | 0.58                  | <0.05               | 0.58            | 0.008               | 0.59                | 0.012               | 0.9             | 67               | 56               |
| ICW - M.M. 43          | 25     | 5/18/01 1050 | 0.5             | 26.01           | 7.88 | 108            | ebb           | 54,090           | 35.8            | 2.4              | 4.40         | 3.0          | 10             | 6.49        | 99.3    | 1.7          | <1                   |                      | 0.35                  | 0.006               | 0.36            | 0.015               | 1.3                 | 58                  | 16              |                  |                  |
| ICW - S.R. 706         | 30     | 5/18/01 935  | 0.5             | 26.17           | 7.62 | 113            | ebb           | 50,900           | 33.5            | 2.3              | 1.80         | 3.3          | 15             | 5.44        | 82.3    | 1.7          | <2                   | 12                   | 0.57                  | <0.05               | 0.57            | 0.010               | 0.58                | 0.022               | 1.5             | 44               | 21               |
| ICW - D.Ross Rd.       | 35     | 5/16/01 855  | 0.5             | 25.91           | 7.87 | 111            | ebb           | 50,500           | 33.4            | CTB              | 1.40         | 2.0          | 15             | 5.67        | 85.2    | 1.4          | 80                   | 140                  | 0.63                  | <0.05               | 0.63            | 0.011               | 0.64                | 0.024               | 2.3             |                  |                  |
| River RR Track         | 40     | 5/18/01 955  | 0.5             | 25.78           | 7.78 | 109            | ebb           | 51,400           | 33.9            | 1.6              | 2.80         | 7.3          | 15             | 6.08        | 92.1    | 1.4          | 1                    |                      |                       | 0.49                | 0.007           | 0.50                | 0.019               | 2.3                 | 81              | 25               |                  |
| NF - Tequesta Dr.      | 51     | 5/3/01 920   | 0.5             | 23.49           | 7.83 | 109            | ebb           | 51,680           | 34.0            | 1.5              | 2.59         | 10.0         | 10             | 7.29        | 106.4   | 1.1          | 2                    | 100                  | 0.74                  | <0.05               | 0.74            | 0.006               | 0.75                | 0.018               | 1.6             | 96               |                  |
| NF - Countyline Rd.    | 55     | 5/3/01 850   | 0.5             | 23.26           | 7.55 | 119            | ebb           | 42,040           | 27.0            | 0.9              | 4.57         | 13.0         | 30             | 5.86        | 80.5    | 1.2          | 78                   |                      | 0.98                  | <0.05               | 0.98            | 0.007               | 0.99                | 0.045               | 3.3             | 17               |                  |
| NF - JD State Park     | 57     | 5/22/01 840  | 0.2             | 24.90           | 6.18 | 67             | fresh         | 622              |                 |                  | 1.89         | 6.0          | 60             | 1.93        | 22.4    | 4.1          | 30                   |                      |                       |                     | 0.69            | 0.073               | 0.76                | 0.031               | 62.5            |                  |                  |
| NWF - Bay              | 60     | 5/9/01 850   | 0.5             | 22.63           | 7.65 | 119            | flood         | 46,430           | 30.2            | 1.5              | 3.41         | 7.8          | 20             | 6.79        | 94.6    | 1.2          | 6                    |                      |                       |                     | 1.00            | 0.007               | 1.01                | 0.025               | 3.9             | 43               |                  |
| NWF - Bay              | 60     | 5/9/01 850   | 1.1             | 22.68           | 7.68 |                | flood         | 46,610           | 30.3            |                  |              |              |                | 6.44        | 89.9    |              |                      |                      |                       |                     |                 |                     |                     |                     |                 |                  |                  |
| NWF - Islandway        | 62     | 5/9/01 902   | 0.5             | 23.38           | 7.57 | 123            | flood         | 37,610           | 24.0            | 1.4              | 4.09         | 11.0         | 30             | 6.40        | 87.1    | 1.4          | 32                   | 80                   | 1.02                  | <0.05               | 1.02            | 0.010               | 1.03                | 0.035               | 3.8             | 30               | 7                |
| NWF - Islandway        | 62     | 5/9/01 902   | 4.1             | 23.35           | 7.59 |                | flood         | 40,030           | 25.6            |                  |              |              |                | 5.78        | 79.4    |              |                      |                      |                       |                     |                 |                     |                     |                     |                 |                  |                  |
| NWF - Osprey Nest      | 63     | 5/9/01 917   | 0.5             | 23.27           | 7.50 | 137            | flood         | 22,310           | 13.5            | 1.6              | 2.09         | 5.0          | 35             | 6.54        | 82.7    | 1.6          | 42                   |                      |                       |                     | 1.44            | 0.017               | 1.46                | 0.045               | 3.7             | 22               | 5                |
| NWF - Osprey Nest      | 63     | 5/9/01 917   | 2.2             | 23.64           | 7.45 |                | flood         | 31,390           | 20.3            |                  |              |              |                | 5.21        | 68.9    |              |                      |                      |                       |                     |                 |                     |                     |                     |                 |                  |                  |
| NWF - JD Park Beach    | 64     | 5/9/01 930   | 0.5             | 23.29           | 7.47 | 140            | flood         | 20,190           | 12.0            | 1.8              | 1.79         | 3.3          | 40             | 6.75        | 84.5    | 1.2          | 38                   |                      |                       |                     | 1.49            | 0.011               | 1.50                | 0.046               | 4.1             | 40               | 5                |
| NWF - JD Park Beach    | 64     | 5/9/01 930   | 3.4             | 23.69           | 7.43 |                | flood         | 24,530           | 15.0            |                  |              |              |                | 5.83        | 72.7    |              |                      |                      |                       |                     |                 |                     |                     |                     |                 |                  |                  |
| NWF - Kitching Cr.     | 65     | 5/9/01 945   | 0.5             | 23.22           | 7.58 | 148            | flood         | 9,870            | 5.6             | 1.7              | 2.09         | 5.3          | 30             | 6.39        | 76.5    | 1.7          | 86                   |                      |                       |                     | 1.37            | 0.007               | 1.38                | 0.049               | 6.3             | 35               | 9                |
| NWF - Kitching Cr.     | 65     | 5/9/01 945   | 3.3             | 24.07           | 7.41 |                | flood         | 21,220           | 12.7            |                  |              |              |                | 5.15        | 66.4    |              |                      |                      |                       |                     |                 |                     |                     |                     |                 |                  |                  |
| NWF - Hobe Groves      | 66     | 5/9/01 1000  | 0.5             | 22.92           | 7.82 | 150            | flood         | 1,417            | 0.7             | 2.0              | 5.71         | 9.3          | 40             | 6.15        | 70.9    | 1.8          | 105                  |                      |                       |                     | 1.75            | 0.014               | 1.76                | 0.056               | 5.3             | 34               | 1                |
| NWF - Hobe Groves      | 66     | 5/9/01 1000  | 2.3             | 22.86           | 7.75 |                | flood         | 1,425            | 0.8             |                  |              |              |                | 5.36        | 63.5    |              |                      |                      |                       |                     |                 |                     |                     |                     |                 |                  |                  |
| NWF - Trapper's        | 67     | 5/9/01 1045  | 0.5             | 22.95           | 7.72 | 160            | fresh         | 802              |                 | CTB              | 2.17         | 3.3          | 30             | 7.24        | 83.6    | 2.8          | 200                  |                      |                       |                     | 1.55            | 0.025               | 1.58                | 0.053               | 12.9            |                  |                  |
| NWF - I - 95           | 68     | 5/9/01 920   | 0.5             | 23.43           | 7.75 | 177            | fresh         | 693              |                 | CTB              | 1.59         | 2.7          | 25             | 6.10        |         | 0.9          | 380                  |                      |                       |                     | 1.16            | 0.048               | 1.21                | 0.042               | 1.0             |                  |                  |
| NWF - S.R. 706         | 69     | 5/9/01 1050  | 0.5             | 24.13           | 7.74 | 174            | fresh         | 678              |                 | CTB              | 2.38         | 3.3          | 25             | 6.37        |         | 1.3          | 4                    | 320                  |                       |                     | 1.22            | 0.014               | 1.23                | 0.036               | 1.5             |                  |                  |
| SF - Jones Cr.         | 71     | 5/3/01 1035  | 0.5             | 23.58           | 7.62 | 114            | ebb           | 47,140           | 30.7            | CTB              | 4.53         | 11.0         | 20             | 5.97        | 84.5    | 1.1          | 86                   |                      |                       |                     | 0.99            | 0.013               | 1.00                | 0.036               | 6.7             | 90               |                  |
| SF - Lox. Riv. Rd.     | 72     | 5/3/01 1010  | 0.5             | 23.33           | 7.78 | 119            | ebb           | 44,480           | 28.5            | 1.1              | 3.81         | 4.7          | 20             | 6.25        | 95.3    | 2.0          | 62                   | 300                  | 1.09                  | 0.053               | 1.14            | 0.024               | 1.16                | 0.031               | 17.6            | 94               | 78               |
| SF - Sim's Cr.         | 73     | 5/3/01 1025  | 0.5             | 23.66           | 7.55 | 114            | ebb           | 44,640           | 28.9            | 0.8              | 3.41         | 6.0          | 20             | 4.39        | 62.1    | 1.9          | 380                  |                      |                       |                     | 0.90            | 0.012               | 0.91                | 0.037               | 4.6             | 94               |                  |
| C18 - S.R. 706         | 81     | 5/9/01 1100  | 0.5             | 22.96           | 8.14 | 158            | fresh         | 601              |                 | CTB              | 1.43         | 4.0          | 20             | 7.61        |         | 1.6          | 86                   |                      |                       |                     | 1.09            | <0.006              | 1.09                | 0.016               | 1.9             |                  |                  |
| C14 - D. stream of G92 | 92     | 5/9/01 1030  | 0.5             | 24.31           | 7.90 | 180            | fresh         | 678              |                 | CTB              | 1.51         | 2.0          | 25             | 7.94        |         | 1.4          | 2                    |                      | 1.29                  | 0.050               | 1.34            | 0.012               | 1.35                | 0.028               | 3.4             |                  |                  |
| Canal -1- J.Farms      | 95     | 5/9/01 1040  | 0.5             | 22.36           | 7.47 | 148            | fresh         | 613              |                 | CTB              | 2.47         | 6.0          | 30             | 4.40        |         | 1.0          | 80                   |                      | 1.41                  | 0.051               | 1.46            | 0.018               | 1.48                | 0.032               | 2.8             |                  |                  |
| Cypress - NWF          | 100    | 5/9/01 1035  | 0.5             | 22.80           | 7.75 | 159            | fresh         | 759              |                 | CTB              | 1.79         | 4.0          | 30             | 6.48        | 74.8    | 2.0          | 200                  |                      |                       |                     | 1.28            | 0.022               | 1.30                | 0.061               | 10.2            | 33               |                  |
| Jenkins Canal          | 101    | 5/22/01 1030 | 0.1             | 23.90           | 6.41 | 151            | fresh         | 523              |                 |                  | 27.20        | 41.0         | 125            | 0.55        | 7.0     | >5.5         | 72                   |                      |                       |                     | 3.89            | 0.019               | 3.91                | 0.245               | 76.5            |                  |                  |
| Hobe Grove Canal       | 104    | 5/9/01 950   | 0.5             | 23.72           | 7.68 | 85             | fresh         | 873              |                 | CTB              | 1.15         | 4.0          | 20             | 8.79        |         | 2.3          | 800                  |                      |                       |                     | 1.44            | 0.023               | 1.46                | 0.032               | 3.5             |                  |                  |
| Cypress -Grove Canal   | 105    | 5/9/01 1005  | 0.5             | 23.24           | 7.47 | 148            | fresh         | 760              |                 |                  | 2.0          | 1.86         | 6.7            | 30          | 5.39    |              | 12                   | 14                   |                       |                     | 1.30            | 0.010               | 1.31                | 0.055               | 1.8             |                  |                  |
| Kitching Creek         | 106    | 5/22/01 915  | 0.5             | 27.10           | 6.55 | 148            | DH            | 13,900           | 11.0            |                  | 2.21         | 14.0         | 55             | 2.30        | 32.7    | 4.0          | 240                  |                      |                       |                     | 1.55            | 0.025               | 1.58                | 0.078               | 4.6             |                  |                  |
| River's Edge Slough    | 107    | 5/9/01 900   | 0.5             | 21.58           | 7.17 | 141            | flood         | 23,100           | 13.8            | CTB              | 2.29         | 3.3          | 30             | 5.46        |         | 1.7          | 740                  |                      |                       |                     | 1.57            | 0.022               | 1.59                | 0.100               | 6.4             |                  |                  |
| Kitching Creek North   | 109    | 5/22/01 1040 | 0.2             | 23.70           | 7.12 | 262            | fresh         | 632              |                 |                  | 6.51         | 6.0          | 60             | 1.28        | 15.3    | 1.3          | 30                   |                      |                       |                     | 1.78            | 0.026               | 1.81                | 0.148               | 23.9            |                  |                  |

# WATER QUALITY INDEX -- 2001

| SEGMENT NAME           | SAMPLE RECORD      |             | TEMP., PH & ALK. |      |      | SAL. & COND. |       | WATER CLARITY |       |        |       | DIS. OXYGEN |      | OXYGEN DEMAND |        | TROPIC STATUS |       |         |        | COLIFORM BACT. |       | BIO. DIV. | WATER QUALITY INDICES |      |     |
|------------------------|--------------------|-------------|------------------|------|------|--------------|-------|---------------|-------|--------|-------|-------------|------|---------------|--------|---------------|-------|---------|--------|----------------|-------|-----------|-----------------------|------|-----|
|                        | DATE               | #STAT'S     | TEMP.            | pH   | ALK. | SAL.         | COND. | TURB.         | SDISC | T.S.S. | COLOR | D.O.        | SAT. | B.O.D.        | T.O.C. | T-NIT.        | NH3-N | T-PHOS. | CHL. A | TOTAL          | FECAL | NAT/ART   | LWQI                  | FWQI | TSI |
| MARINE / COASTAL       | Jan-01             | 5           | 21.5             | 7.80 | 124  | 34.3         | 52.1  | 3.8           | 1.8   | 9.1    | 13    | 8.81        | 94.3 | 1.1           |        | 0.47          | 0.05  | 0.014   | 1.88   | 20             | 11    |           | 91                    | 24   | 35  |
|                        | Mar-01             | 5           | 22.4             | 7.53 | 117  | 30.3         | 48.7  | 4.7           | 1.3   | 9.9    | 24    | 8.56        |      | 1.4           |        | 0.79          | 0.05  | 0.023   | 2.59   | 197            | 84    |           | 77                    | 38   | 42  |
|                        | May-01             | 5           | 25.8             | 7.77 | 110  | 34.7         | 52.4  | 2.8           | 2.4   | 3.1    | 10    | 5.99        | 90.8 | 1.5           |        | 0.80          | 0.05  | 0.018   | 1.5    | 85             | 19    |           | 87                    | 28   | 31  |
|                        | Jul-01             | 5           |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | Sep-01             | 5           |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | Nov-01             | 5           |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | ANNUAL AVG'S.      | 2001 6 runs |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        |                    | 2000 6 runs | 28.3             | 7.71 | 120  | 32.4         | 49.4  | 2.5           | 2.27  | 8.8    | 12    | 6.38        | 92.2 | 1.23          |        | 0.78          | 0.05  | 0.016   | 2.50   | 83             | 37    |           | 85                    | 30   | 34  |
|                        |                    | 1999 6 runs | 25.4             | 7.75 | 122  | 30.0         | 46.8  | 1.9           | 1.72  | 5.9    | 28    | 8.41        | 92.5 | 1.48          |        | 0.85          | 0.092 | 0.034   | 3.58   | 80             | 12    |           | 85                    | 30   | 46  |
|                        |                    | 1998 6 runs | 25.4             | 7.82 | 119  | 28.7         | 44.3  | 1.9           | 2.05  | 4.8    | 24    | 8.42        | 91.9 | 1.52          |        | 0.99          | 0.057 | 0.037   | 3.15   | 53             | 15    |           | 84                    | 31   | 42  |
| HISTORIC AVG'S.        | 1998-2001 4 years  |             |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | 1994-1997 4 years  | 25.4        | 7.88             | 116  | 30.7 | 47.4         | 2.4   | 1.81          | 8.8   | 20     | 6.58  | 78.8        | 1.32 |               | 1.14   | 0.053         | 0.040 |         | 43     | 39             | 2.78  | 80        | 35                    | 49   |     |
|                        | 1982-1993 12 years | 25.4        | 7.78             |      | 29.0 | 44.7         | 2.38  | 1.44          |       | 19     | 6.31  | 75.7        | 0.91 |               | 0.70   | 0.079         | 0.087 |         | 47     | 28             | 3.23  | 91        | 24                    |      |     |
|                        | 1970-1981 12 years | 24.2        | 7.99             | 64   | 27.7 | 42.8         | 1.75  |               |       | 25     | 6.53  | 79.1        | 0.64 |               | 0.59   | 0.118         | 0.081 |         | 162    | 28             |       | 93        | 22                    |      |     |
|                        |                    |             |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
| ESTUARINE              | Jan-01             | 8           | 17.3             | 7.87 | 128  | 33.0         | 50.2  | 3.7           | 1.4   | 10.8   | 18    | 7.33        | 90.7 | 0.9           |        | 0.44          | 0.05  | 0.018   | 2.55   | 67             | 29    |           | 93                    | 22   | 40  |
|                        | Mar-01             | 8           | 23.5             | 7.70 | 125  | 29.9         | 46.2  | 4.9           | 1.0   | 8.8    | 28    | 8.80        | 94.3 | 1.2           |        | 1.02          | 0.05  | 0.031   | 5.89   | 507            | 17    |           | 80                    | 35   | 49  |
|                        | May-01             | 8           | 23.8             | 7.68 | 116  | 28.7         | 45.7  | 3.7           | 1.3   | 8.9    | 21    | 8.13        | 87.0 | 1.4           |        | 0.92          | 0.05  | 0.031   | 5.5    | 100            | 81    |           | 76                    | 39   | 48  |
|                        | Jul-01             | 8           |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | Sep-01             | 8           |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | Nov-01             | 8           |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | ANNUAL AVG'S.      | 2001 6 runs |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        |                    | 2000 6 runs | 28.1             | 7.59 | 125  | 28.5         | 43.9  | 4.2           | 1.23  | 9.3    | 27    | 5.73        | 81.8 | 1.83          |        | 1.08          | 0.072 | 0.032   | 7.29   | 805            | 70    |           | 70                    | 45   | 48  |
|                        |                    | 1999 6 runs | 25.2             | 7.59 | 110  | 18.7         | 29.7  | 2.7           | 1.12  | 5.7    | 76    | 5.88        | 75.1 | 1.77          |        | 1.20          | 0.132 | 0.055   | 4.31   | 1420           | 231   |           | 85                    | 50   | 51  |
|                        |                    | 1998 6 runs | 25.8             | 7.49 | 118  | 20.1         | 32.2  | 3.25          | 1.38  | 4.4    | 52    | 5.82        | 77.8 | 1.88          |        | 1.38          | 0.085 | 0.055   | 6.74   | 139            | 133   |           | 71                    | 44   | 51  |
| HISTORIC AVG'S.        | 1998-2001 4 years  |             |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | 1994-1997 4 years  | 25.5        | 7.58             | 111  | 19.8 | 30.9         | 2.50  | 1.28          | 5.5   | 65     | 5.99  | 83.5        | 1.84 |               | 1.40   | 0.084         | 0.056 |         | 257    | 155            | 2.68  | 70        | 45                    | 56   |     |
|                        | 1982-1993 12 years | 25.8        | 7.58             | 95   | 21.2 | 34.4         | 3.11  | 1.4           |       | 36     | 5.92  | 71.7        | 1.34 |               | 0.73   | 0.070         | 0.085 |         | 310    | 78             | 2.85  | 81        | 34                    |      |     |
|                        | 1970-1981 12 years | 24.6        | 7.78             | 121  | 22.0 | 36.9         | 3.57  | 1.2           |       | 58     | 6.38  | 78.8        | 1.30 |               | 0.68   | 0.131         | 0.062 |         | 739    | 125            | 3.74  | 84        | 31                    |      |     |
|                        |                    |             |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
| WILD AND SCENIC RIVER  | Jan-01             | 7           | 15.4             | 7.78 | 205  | 7.2          | 11.9  | 1.9           | 1.4   | 4.7    | 43    | 7.59        |      | 1.0           |        | 0.76          |       | 0.031   | 2.44   | 140            | 102   |           | 95                    | 25   |     |
|                        | Mar-01             | 7           | 20.3             | 7.54 | 172  | 3.0          | 5.9   | 2.4           | 1.7   | 4.9    | 47    | 8.05        | 68.8 | 1.6           |        | 1.55          | 0.09  |         | 3.10   | 400            | 55    |           | 77                    | 43   |     |
|                        | May-01             | 7           | 23.3             | 7.65 | 155  | 4.7          | 8.0   | 2.5           | 1.8   | 4.6    | 32    | 8.51        | 79.6 | 1.6           |        | 1.45          |       | 0.047   | 5.0    | 320            | 122   |           | 79                    | 41   |     |
|                        | Jul-01             | 7           |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | Sep-01             | 7           |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | Nov-01             | 7           |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | ANNUAL AVG'S.      | 2001 6 runs |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        |                    | 2000 6 runs | 25.1             | 7.64 | 172  | 3.9          | 6.4   | 2.75          | 1.42  | 4.8    | 53    | 5.20        | 63.9 | 1.78          |        | 1.32          | 0.050 | 0.050   | 4.47   | 223            | 224   |           | 72                    | 48   |     |
|                        |                    | 1999 6 runs | 23.6             | 7.47 | 122  | 2.2          | 3.3   | 2.58          | 1.32  | 4.9    | 85    | 5.51        | 63.3 | 1.88          |        | 1.12          | 0.118 | 0.059   | 3.33   |                | 624   |           | 87                    | 53   |     |
|                        |                    | 1998 6 runs | 24.7             | 7.53 | 156  | 1.3          | 2.1   | 1.80          | 1.60  | 3.4    | 58    | 5.34        | 65.1 | 1.32          |        | 1.11          | 0.080 | 0.047   | 3.43   | 228            | 129   |           | 80                    | 40   |     |
| HISTORIC AVG'S.        | 1998-2001 4 years  |             |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | 1994-1997 4 years  | 24.4        | 7.35             | 137  | 0.9  | 1.7          | 1.66  | 1.47          | 3.3   | 85     | 5.28  | 61.3        | 1.48 |               | 1.03   | 0.087         | 0.087 |         | 580    | 138            | 2.53  | 74        | 46                    |      |     |
|                        | 1982-1993 12 years | 24.1        | 7.32             | 151  | 0.4  | 0.2          | 2.36  | 1.83          | 5.4   | 71     | 4.89  | 58.4        | 1.08 |               | 1.01   | 0.071         | 0.082 |         | 180    | 2.87           |       | 75        | 45                    |      |     |
|                        | 1970-1981 12 years | 24.0        | 7.41             | 179  | 0.3  | 0.3          | 4.31  |               | 12.1  | 60     | 5.01  | 59.7        | 0.98 |               | 0.89   | 0.044         | 0.075 |         | 1835   | 96             | 3.02  | 89        | 51                    |      |     |
|                        |                    |             |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
| FRESHWATER TRIBUTARIES | Jan-01             | 7           | 15.9             | 7.78 | 212  | 0.5          | 0.7   | 2.0           | ctb   | 4.3    | 51    | 8.02        |      | 1.2           |        | 0.94          | 0.07  | 0.030   | 6.43   |                | 129   |           | 88                    | 32   |     |
|                        | Mar-01             | 8           | 21.3             | 7.18 | 185  |              | 1.7   | 2.3           |       | 3.3    | 51    | 6.43        | 68.0 | 1.5           |        | 1.50          | 0.07  | 0.056   | 3.51   |                | 73    |           | 79                    | 41   |     |
|                        | May-01             | 8           | 23.9             | 7.39 | 137  | 1.4          | 3.0   | 1.8           | ctb   | 5.8    | 34    | 5.61        |      | 1.9           |        | 1.29          | 0.05  | 0.042   | 11.3   |                | 182   |           | 70                    | 50   |     |
|                        | Jul-01             |             |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | Sep-01             |             |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | Nov-01             |             |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | ANNUAL AVG'S.      | 2001 6 runs |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        |                    | 2000 6 runs | 25.0             | 7.44 | 170  | 0.5          | 0.8   | 2.83          |       | 4.8    | 59    | 5.43        |      | 1.82          |        | 1.21          | 0.088 | 0.057   | 8.19   |                | 178   |           | 70                    | 50   |     |
|                        |                    | 1999 6 runs | 23.9             | 7.25 | 127  | 0.7          | 0.8   | 2.88          |       | 4.8    | 100   | 5.40        | 58.8 | 1.75          |        | 1.16          | 0.085 | 0.085   | 5.47   |                | 391   |           | 69                    | 51   |     |
|                        |                    | 1998 6 runs | 24.8             | 7.22 | 139  | 0.7          | 1.1   | 2.15          |       | 3.7    | 71    | 5.65        | 67.2 | 1.68          |        | 1.08          | 0.095 | 0.083   | 5.61   |                | 96    |           | 74                    | 46   |     |
| HISTORIC AVG'S.        | 1998-2001 4 years  |             |                  |      |      |              |       |               |       |        |       |             |      |               |        |               |       |         |        |                |       |           |                       |      |     |
|                        | 1994-1997 4 years  | 24.2        | 7.09             | 128  | 0.4  | 0.6          | 1.71  | 0.84          | 3.5   | 82     | 5.07  | 61.4        | 1.71 |               | 0.98   |               | 0.095 |         |        | 146            |       | 71        | 49                    |      |     |
|                        | 1982-1993 12 years | 24.8        | 7.23             | 146  | 0.4  | 0.8          | 3.85  | 1.02          | 8.1   | 69     | 5.05  | 59.0        | 1.47 |               | 1.16   | 0.085         | 0.082 |         | 742    | 308            |       | 67        | 53                    |      |     |
|                        | 1970-1981 12 years | 25.4        | 7.63             | 149  | 0.3  | 0.5          | 2.91  |               |       | 49     | 5.21  | 62.1        | 1.03 |               | 0.92   | 0.068         |       |         | 1864   |                |       |           |                       |      |     |

**MARTIN COUNTY AUDUBON SOCIETY**

A CHAPTER OF THE FLORIDA AUDUBON SOCIETY

POST OFFICE BOX 131

STUART, FLORIDA 34995-0131

August 17, 2001

Ms. Trudi Williams, Chair  
Board of Directors  
South Florida Water Management District  
c/o TKW Consulting Engineers  
12553 New Brittany Boulevard  
Ft. Myers, Florida 33907

Dear Chairwoman Williams:

A large portion of the Loxahatchee River is in Martin County, so the development of Minimum Flows and Levels for this River is very important to us. Great concerns exist about the development of the criteria to set these levels. These concerns include the following:

- (1) The information being used to establish Minimum Flows and Levels for the Loxahatchee River is incomplete and some of the criteria being used has little established scientific basis.
- (2) Only the Southwest Fork is partially channeled, not the entire River and all of its tributaries, yet the River is being treated as a water conveyance full of structures, not the ecosystem that it is.
- (3) The status quo is not acceptable. The River's headwaters, the estuary and the River itself should not simply be maintained, but restored to the greatest extent possible. This is in congruence with the State's similar commitment to the Everglades Recovery Plan.
- (4) The emphasis in the MFL report seems to be establishment of a threshold for "significant harm." Statutes require "resource" protection in setting Minimum Flows and Levels, not solely the collection of "near death" indicators.



Ms. Trudi Williams, Chair  
August 17, 2001  
Page Two

- (5) The Upper and Lower East Coast Water Supply Plans and the Northern Palm Beach County Water Supply Plan were developed without having evaluated the water supply needs for the River. The Minimum Flows and Levels are to be set using the leftovers after allocations have been designated for all other uses in those Plans. That is a sham on the public.
- (6) MFL criteria are being set without the review and understanding of the total water budget for the River, without an historical model being run, and without a review of all existing permits in the basin to understand the combined effects of surface and groundwater movement, agriculture usage and water utilities withdrawals.

Please do not set Minimum Flows and Levels for the Loxahatchee River using flawed, incomplete information and baseless "scientific criteria." Change the schedule to do the kind of criteria development and modeling this River deserves. Please do not continue to tell the public that existing consumptive use permits affecting flows to the River can be reduced in the future without telling the public how long the legal battles to do this will take. Please do provide funding for the kind of research and modeling needed to establish MFL for a sustainable river ecosystem. Give the Loxahatchee River its own consumptive use permit.

Thank you for your consideration of these comments.

Sincerely,



Bob Matheson  
Conservation Chair

cc: Henry Dean, Executive Director, South Florida Water Management District  
Dave Swift, South Florida Water Management District MFL Program  
Paul Miller, South Florida Water Management District, Martin/St. Lucie Svc. Center  
Patricia McGrogan, President Friends of the Loxahatchee River



HIGGINS ENGINEERING, INC.

7-5 P.O. 1  
C: DAVE SWIFT  
MATT MOSE  
SCOTT BURN  
DMLC, Pls make  
changes  
Document  
J

(VIA FACSIMILE)

MEMORANDUM

To: Ken Ammon

August 28, 2001

Fm: Bob Higgins

Re: Loxahatchee River Minimum Flows and Levels - Draft Report

Attached is Page 1 of 7 from your draft report. This particular page is intended to describe the recharge waters going to the Town of Jupiter and Seacoast Utilities. I have highlighted the one paragraph that is written very poorly to the point of being incorrect. As you will see, it appears that the listed flows are additive, where in reality, the water that goes into the Golf Digest system is recharge water for Seacoast Utilities. At a minimum, this section needs to be rewritten very carefully. Let me know if you need my assistance.

If you have any questions on the above, please feel free to give me a call.

RWH:lmg

95-11.3

Attachment

cc: Scott Burns w/  
Dave Swift w/  
Jim Harvey w/  
Dick Tomasello w/

The water supply functions of the C-18 basin are summarized in part in the draft NPBC Comprehensive Water Management Plan (in prep). These include:

- Providing a base flow of 65 cfs over the Lainhart Dam to the NW Fork of the Loxahatchee River
- Providing supplemental water to the Loxahatchee Slough to maintain water levels that do not fall more than 0.5 ft. below the identified slough hydroperiod target.
- Providing up to 5 cfs of base flow to the Southwest Fork of the Loxahatchee River through S-46 to aid in water quality improvement for C-18 and the downstream estuary.
- Providing recharge for local water supply utilities. This includes providing up to 20 cfs (13 mgd) of recharge to the Golf Digest surface water management system to protect wetlands, up to 20 cfs (13 mgd) of recharge for the Town of Jupiter to prevent saltwater intrusion of local ground water supplies, and up to 23.5 cfs (14 mgd) of recharge for SeaCoast Utilities (Table 17).

Current water use permits for seacoast Utility and the Town of Jupiter limits withdrawals from the C-18 canal when stages in the canal fall below 14.0 ft. NGVD. In addition, special conditions of the Golf Digest environmental resource permit include the

Table 18. SeaCoast Utility Authority estimated water supply demands with and without the Golf Project (Source NPBCCWMP, in prep)

| Wellfield Name     | Without Golf Digest (MGD) | With Golf Digest (MGD) |
|--------------------|---------------------------|------------------------|
| Hood Road          | 10.4                      | 13.8                   |
| North Palm Beach   | 2.7                       | 2.5                    |
| Burma Road         | 2.4                       | 2.9                    |
| Palm Beach Gardens | 4.3                       | 4.3                    |
| Total              | 19.8                      | 23.5                   |

requirement to cut off flows to the Golf Digest project when C-18 drops below 14.0 ft. NGVD. The average daily withdrawal rates for Seacoast Utility Authority authorized by water use permit number 50-00365-W are shown Table 18 above.

The Southwest Fork is important for navigational and recreational use because it provides access to local marinas and private homes. It also provides a mixing zone for discharges from C-18 Canal before they reach more sensitive grass beds and oysters located further downstream.

Surface Water Quality

Surface water quality within the estuary is quite variable, and is highly dependent on the mix of saltwater and freshwater. Sea water is saline, typically very clear, fairly high in dissolved oxygen, and low in nutrients and bacteria. Conversely, freshwater discharges to the estuary from inland sources typically have less clarity, are lower in dissolved oxygen content, and contain greater concentrations of nutrients and bacteria counts. Therefore, water quality varies at different points within the estuary. The water quality recorded on a high tide during the dry season can be quite different from the quality of water recorded on an outgoing tide during a high rainfall period.

Nine water quality sampling stations located in the Sub-basin 3 have been monitored

RECEIVED

SEP 05 2001  
EXECUTIVE OFFICE

Tom and Shirl Brandlein  
136 N. Anchorage Drive  
North Palm Beach, FL 33408  
(561) 776-8303 phone/fax

9-1  
~~July 7, 2001~~

To:  
The Palm Beach Post, Editor  
PO Box 24700  
West Palm Beach, FL 33416

Henry Dean, Executive Director ✓  
South FI Water Management Dist.  
PO Box 24680  
West Palm Beach, FL 33416

Sun Sentinel  
200 E. Las Olas Blvd.  
Ft. Lauderdale, FL 33301

To Whom It May Concern:

We have recently been informed of a plan to pump from the upper waters of the Loxahatchee River. We are writing because we find this proposal an atrocity.

How can this action be lawfully considered? This land and river are supposed to be a protected area to be enjoyed by all. If additional homes and developments are going to be allowed shouldn't the water issue be determined prior to permitting? What about the development following Mirasol and WTC? Where will that water come from? Is there no thought or planning!?

I wouldn't find it so appalling if pumping were to take place well below Trapper Nelson's where the fresh water is close to the ocean but it still does not cover the future.

We strongly oppose this plan and want answers as to why this is even being considered.

Sincerely,

Tom and Shirl Brandlein  
Cc: Congressman Mark Foley 627-6192  
Congressman Clay Shaw 382-3007  
Palm Beach County Commissioner Karen Marcus 955-2201

## **Key Points Related to the Loxahatchee River Minimum Flow and Level (MFL)**

**March 22, 2002**

**Developed by the Department of Environmental Protection's: Division of Water Resource Management, Division of Recreation and Parks, Southeast District Office (SED), and the Office of Ecosystem Projects**

1. **DEP is working closely with SFWMD to establish a framework/pathway to reach consensus on establishing an appropriate MFL for the river. This includes:**
  - a. The development of an "unconstrained" restoration vision for the river. This was jointly developed by SFWMD and the DEP Division of Recreation and Parks.
  - b. Examination of constraints on achieving restoration and development of a "practical restoration goal" that would include the desired flow and any additional work (vegetation manipulation, etc) that may be necessary. This has not been completed.
  - c. Deciding what role the MFL "tool" should play in achieving the practical restoration goal (as discussed below).
2. **There are two procedural options for establishing an MFL. The SFWMD Governing Board should determine which approach to adopt, but it is important for both approaches to be presented to the Board:**
  - a. Establish a "restoration" MFL along with the associated recovery strategy to meet the MFL over time. **This is the approach the DEP prefers as it clearly establishes the strategy that will achieve the mutually agreed upon practical restoration goal.**
  - b. Establish an "interim" MFL, along with a recovery strategy (as needed), with the commitment of the involved agencies that we will work cooperatively to pursue a restoration program to achieve the practical restoration goal. As the restoration program proceeds, the MFL would need to be revised, or reservations of water adopted to protect the enhanced flows in the river.
3. **The Northern Palm Beach County Comprehensive Water Management Plan (NPBCCWMP) did not identify a scientifically based MFL. The Northern Palm Beach County Comprehensive Water Management Plan focused primarily on water supply, with less emphasis on natural system restoration or MFLs. It is unclear how the flow target identified in the Plan relates to the technical analysis SFWMD is currently doing to establish a MFL. The FDEP SED previously objected to the draft plan's lack of consideration of river restoration, and the failure to fully meet even the plan's target flows for the river.**
4. **Florida State Park Staff did not participate in the development of the NPBCCWMP. Jonathan Dickinson State Park staff was not involved in the**



development of the plan or the flow target. The flow target identified in the plan should not substitute for the technical analysis currently underway that will determine the ecologically appropriate MFL for the river.

5. **There is a disconnect between the CERP, the NPBCCWMP, and the Loxahatchee MFL.** Under federal law, reservations for "new water" for natural systems must be identified for the CERP projects. It is unclear how reservations for the CERP projects, which have not yet been determined, relate to the Loxahatchee MFL or the NPBCCWMP. If an interim MFL is identified, all parties should still realize that CERP reservations should achieve the practical restoration goal, not just the interim MFL. These projects need to be examined to determine if design changes could be made to maximize the water that they provide to the natural system.
6. **Design of the Northern Palm Beach CERP projects needs to be investigated and optimized so that they can contribute to the restoration of Loxahatchee River.** It would be a mistake for federal and state authorities to spend billions of dollars restoring the Everglades Ecosystem and meeting South Florida's water supply needs without simultaneously addressing the restoration needs of the Loxahatchee River as part of the process. Furthermore, it is not in the public interest to have to spend more public dollars to modify constructed CERP projects at a later date because the needs of the Loxahatchee River were not adequately identified now.
7. **The MFL must be based on science and the recovery strategy must be coordinated with projects identified in CERP and the NPBCCWMP.** Before any conclusions can be made about the appropriate MFL for the Loxahatchee River, it is critical that the technical analysis be completed and presented in a technical report. The revised analysis would greatly benefit from an independent Scientific Peer Review. DEP supports the establishment of a "restoration" MFL, the adoption of which should be accelerated so that these efforts can be coordinated with the CERP and NPBCCWMP.